CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

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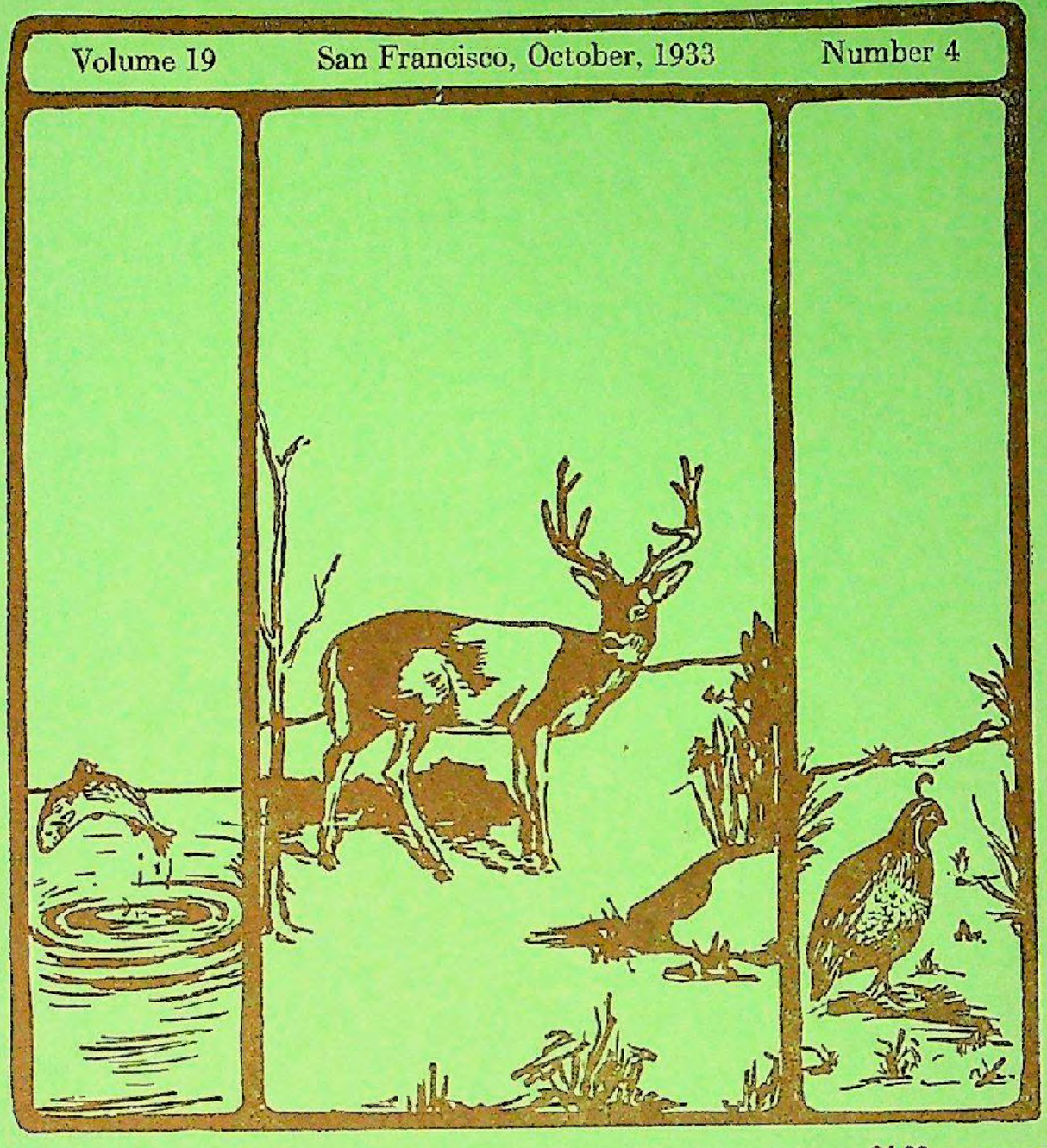

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SWORDFISHING

By RALPH BANDINI

With four pen and ink sketches by the author

IF YOU SEEK THRILLS—if you aspire to be left breathless, gasping, perhaps swearing—if you crave to nurse aching muscles and raw, blistered hands—if you are looking for the spice of physical danger—if you want to hate yourself, your friends, and particularly your quarry—I say if you would like to experience any or all of these sensations, then by all means, my friends, go swordfishing, for marlin or broadbill, either one. It's a great game and a trying one—it takes patience and skill. You come to a point when you swear you'll never

do it again (just as you do over golf when your game goes wrong) but there's something about it that pulls and pulls and pulls until you find yourself out there once again, plowing along the shimmering sea, watching, watching, watching for those telltale fins.

In the first place and before we go too far it might be just as well to correct an erroneous impression regarding these two fish. There are *not* two species of swordfish—broadbill and marlin. There is but *one* true swordfish, the *Xiphias gladius*. Here in California we call him broadbill. He is found in most waters of the world and, so far as I know, is precisely the same wherever you find him. It is true that Zane Grey has heard tales of a swordfish with his sword on the under jaw and frequenting the waters of the Paumotu Archipelago. However, I understand that he has not seen such a species with his own eyes and

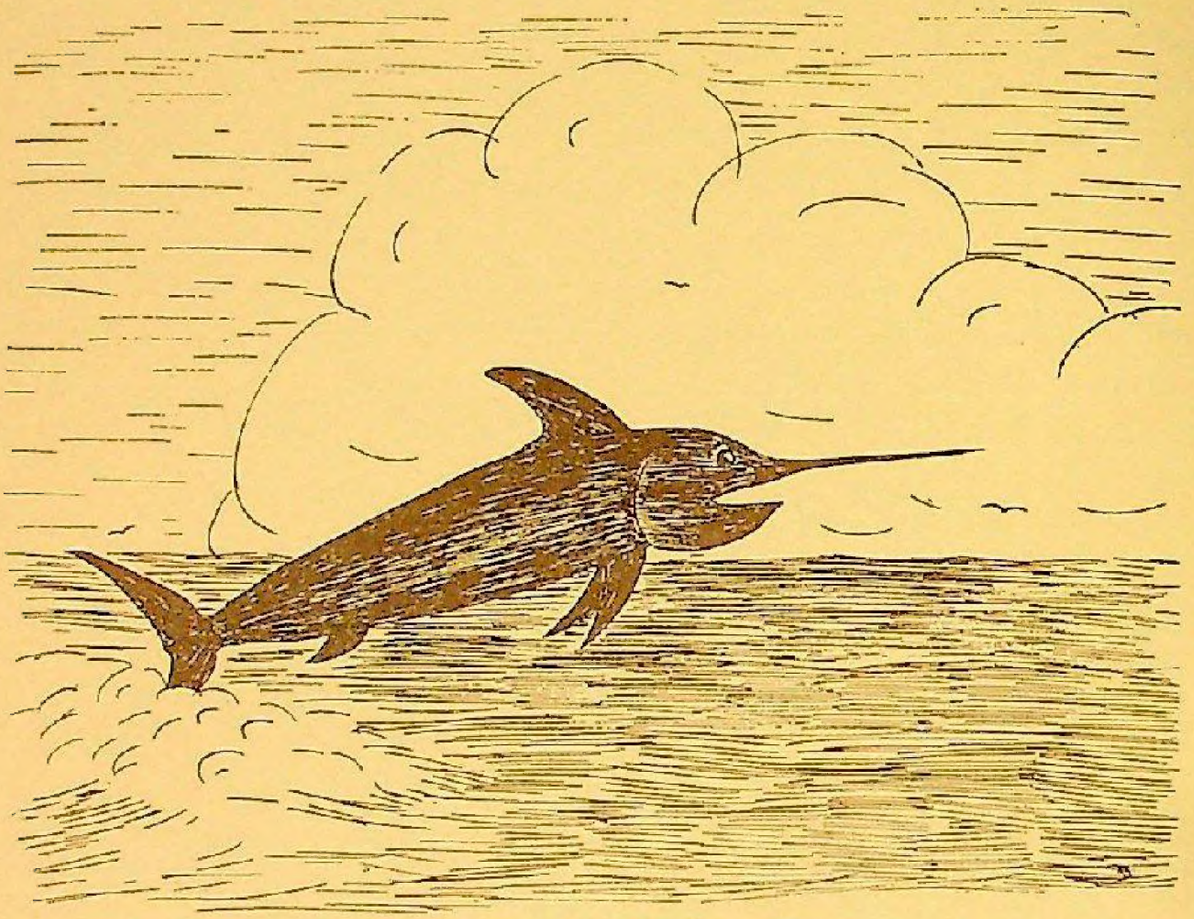

FIG. 74. Broadbill swordfish jumping.

does not claim that it exists, other than to testify that the description does not materially vary over some thousand miles of islands. Until this strange species is definitely proved, we may as well accept that there is but one variety.

The marlin, on the other hand, is *not* a swordfish at all. He is a spear fish and is closely related to the sailfish or the sailfish to him, it doesn't matter which. I think I am correct when I say that the name marlin swordfish originated at Santa Catalina Island. Many years ago when these fish first began to be taken, we didn't know what they were. They had a sort of spike projecting a foot or two from their upper jaw and somewhat resembling a marlinspike. Not knowing what they really were and seeing them equipped with something which might be called a sword, we named them marlin swordfish. It may be interest-

ing to know that the name so casually bestowed is now universally accepted among big game anglers and their publications throughout the world.

So much for these two species of splendid fighting adventurers from out the Seven Seas. Now let us try to see a picture of each as a courageous adversary and what he does and how he acts, and how you act, too. First the broadbill.

The broadbill swordfish is rarely hooked blind or, in other words, hooked when trolling and when he is unseen. We cruise about the channels off the Southern California coast watching for the two crescent fins or, and more correctly, fin and tail. They stand up out of the water one, two or three feet, depending upon the size of the fish and how deep he may be swimming. They weave back and forth insolently, arrogantly. As you approach you can see him swing, the twist of the dorsal, or forward, fin gives the impression that he is cocking his head at you, lazily studying this surface creature which is stealing up on him. There is a thrill to the sight of these two fins that never fails a swordfish angler.

At first don't try to get too close. The best procedure, I mean that which I have found best, is to keep pretty well away and pay out 150 to 200 feet of line. Your best bait is a barracuda or mackerel. Then start circling the fish slowly, narrowing the circles until after three or four of them you can drag your bait 30 or 40 feet in front of his nose. When you think you are in a good position, stop the boat, letting the bait sink slowly by its own weight. Personally I don't believe the broadbill has a wide angle of vision, forming that belief upon his actions. In the first place he twists and turns as though it were difficult for him to follow your movements. Then, frequently, when the bait appears to be where he can see it plainly, he pays no apparent attention to it at all. Again, when you know that it is squarely in front of him he will almost always go down toward it.

Right there is the second thrill. That great tail flirts, a boiling swirl spreads, and he sounds, down toward your bait. Then come two or three minutes of suspense. Will he take it? Is he looking it over preparatory to slashing at it with his sword? No, he doesn't take it. There he surfaces 100 yards away, weaving along nonchalantly as though you and your nice fat bait never existed.

That is one of the trying and alluring things, too, about broadbill swordfishing, their reluctance to take a bait. I have spent about 17 years fooling around with them. My own experience has been that perhaps one out of 16 fish worked will bite. The others go down, look it over, and go along their way. Nobody has yet solved the secret of making them strike. You think you have it, and the next 10 fish put you in your place. I don't know why it is unless they feed deep and when you see them on the surface they are loafing, sunning themselves after gorging. I sometimes wonder if when they bite at all it is not through viciousness rather than hunger. Perhaps; quien sabe? Take one out of 16 fish worked taking the bait; say that seeing two fish a day over a season's hunting is a pretty high average; consider day after day plowing over the sea under a burning sun (for it is only on hot, smooth days that you are likely to find them); mix with the sauce of

heartbreaking physical labor, actual painful effort, if you do hook on to one, and you may have some idea of the patience, the doggedness, the perseverence necessary in broadbill fishing. Then, you quite reasonably ask, why the lure of it? I'll tell you. Just over the horizon's edge may be the fish of fish! Inside of 15 minutes you may be pitting your strength and skill against as formidable an adversary as it will ever be your luck to meet, one that may keep you out there in painful, back breaking labor for as long as 24 hours in a single fight. You are hunting a fish who is an individualist if ever there was one, who never does the same thing twice running, who may sound hundreds of feet and sulk there all day and all night, or who may charge your boat time after time, sword out, great jaws wagging, the picture of insensate fury, or who may leap in great, awkward lunges, throwing white water

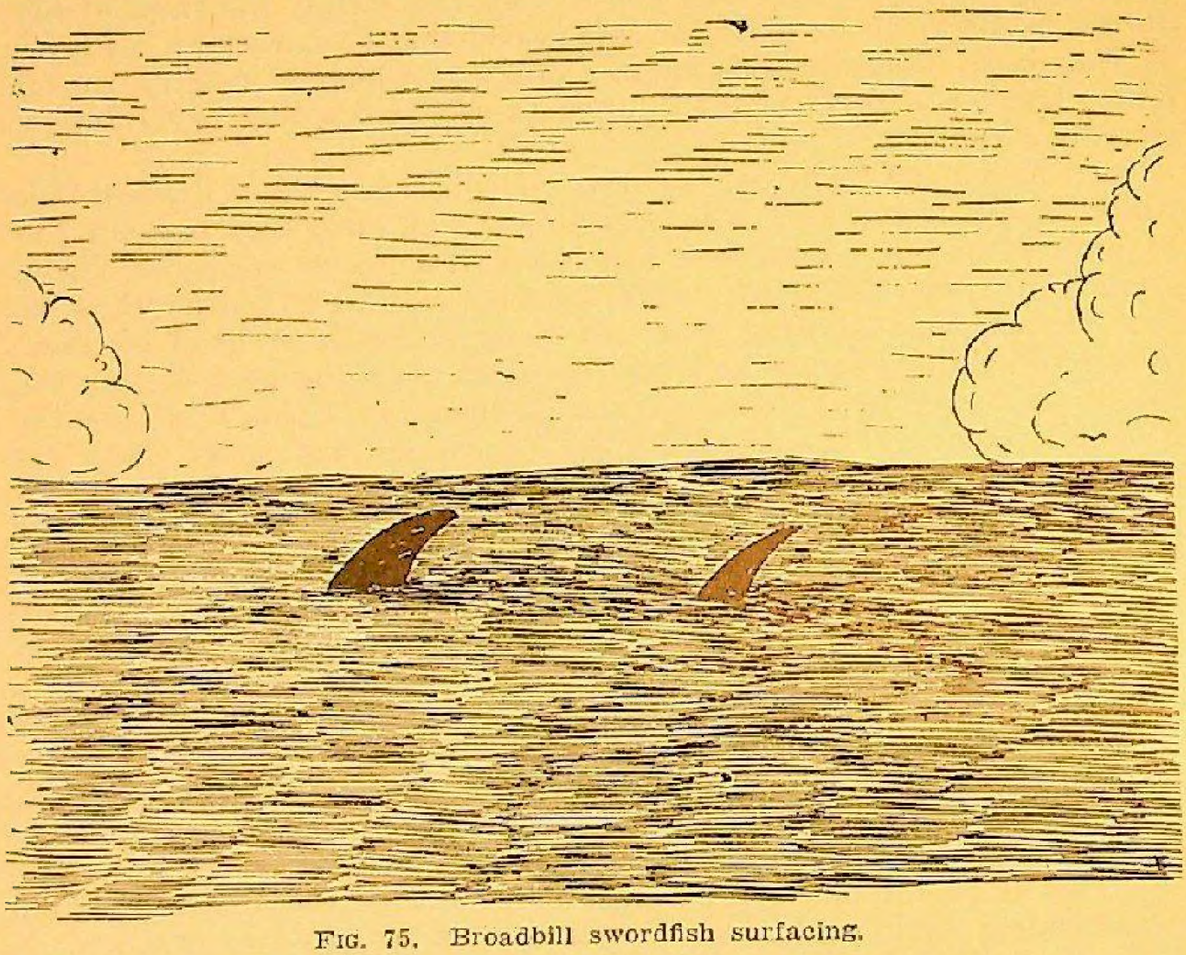

FIG. 75. Broadbill swordfish surfacing.

10 feet in the air as he smashes back, or who may deliberately swim right up to your boat and calmly look you over as though he were determining by observation just what tactics he will pursue. It's a great game!

Although they are fast enough when they want to be, as a general thing broadbill are slow of movement when hooked. They may rush around the surface for a few minutes, but very soon they'll start sounding, leisurely, inexorably. It is something like the sinking of a vessel. The reel just barely turns over—"WHRRR-WHRRR-WHRRR"—but you can't stop it! You can tighten your drags all you want; you can thumb the line; you can give the rod all it will stand, but that devilish sinking continues as though you were not in the picture at all. Presently it stops of its own accord, and he starts off, still slowly, nonchalantly, on

a course. There is nothing for you to do but follow. I once fought a fish for nine hours and in that time he towed us about 17 miles on a course as steady as that of a steamer. He would surface once in a while, circle us two or three times, and sound again, picking up the same course he had left. Toward the end of the fight I thought we would have to gaff him in the surf at White's Landing, Catalina, so straight for the island was he driving. But we didn't—the leader broke!

No two swordfish act alike. You never know what the particular one you may be hooked on to will do. You never know how they'll take the bait. Sometimes there will be just the faintest tug and your line will float slowly off. Another one will slash the bait with his sword, a blow that travels clear down to your toes. But always, when you have a strike, feed him plenty of line. One hundred feet is none too much. Give him lots of chance to swallow it before striking him yourself. Once I hooked one that I fed the bait to, or at least I thought I hooked him, for we had a knock down and drag out fight for 20 minutes or so. Then everything went slack. I thought I had pulled the hook out, but the line felt heavy reeling in. When I had brought it up to the boat there was my barracuda as whole as when I had put it on. That fish had merely held it crossways in his mouth and had pulled against me as a puppy pulls against a rag. When he got tired of playing he just opened his mouth and that was that. Another one I had, after two hours and a half of the hardest fighting I knew how to give, started feeding on a school of anchovies. He never knew he was hooked. I know that sounds like the "Believe it or not" column, but it's true.

Broadbill have not alone tremendous strength but unbelievable vitality as well. I remember one fish that was hooked and landed off Point Vicente. He was loaded on to the deck of the launch and brought back to Avalon two hours and a half away. When he was hoisted on to the pleasure pier there, he came to life, wrecked the standard upon which he was hung and carried away a piece of the railing. From the days of the Phoenicians down, there have been told countless tales of broadbill swordfish, of their strength and viciousness. Personally I don't think that they are vicious, if left alone, but if hooked they will fight back, and who can blame them.

No, broadbill are great fish. They are, perhaps, the most difficult of all to successfully land. I don't know just what the percentage is but I would say off hand that not more than one fish out of every ten hooked is brought to gaff. Figure it out for yourself—one fish in 16 will take a bait, the average seeing of two a day is good, and one out of 10 hooked will be brought in! No wonder we stay at the game against our better judgment, against our physical comfort, against our health (for it's no child's play) and against the best interests of our pocket-books. Once you have tasted the lure of it, you will never forget it, never care quite so much for any other kind of fishing. It is a pity there aren't more of them out here for nowhere in the wide world will you find such ideal weather and water conditions under which to carry on your struggle with a formidable foe as you will in the channels off southern California.

Now the marlin is a very different creature; an amazing thing of purple, bronze, silver, green and gold, and striped with purple. His dorsal fin normally lies flat in a groove along his back, his tail is curved

and slender, much like a sickle. When you see him on the surface, it is this tail which shows, and there is a thrill to it, no doubt of that. One minute you will be cruising over an empty sea, your flying fish bait shimmering astern. Then next, on every side of you, will be these

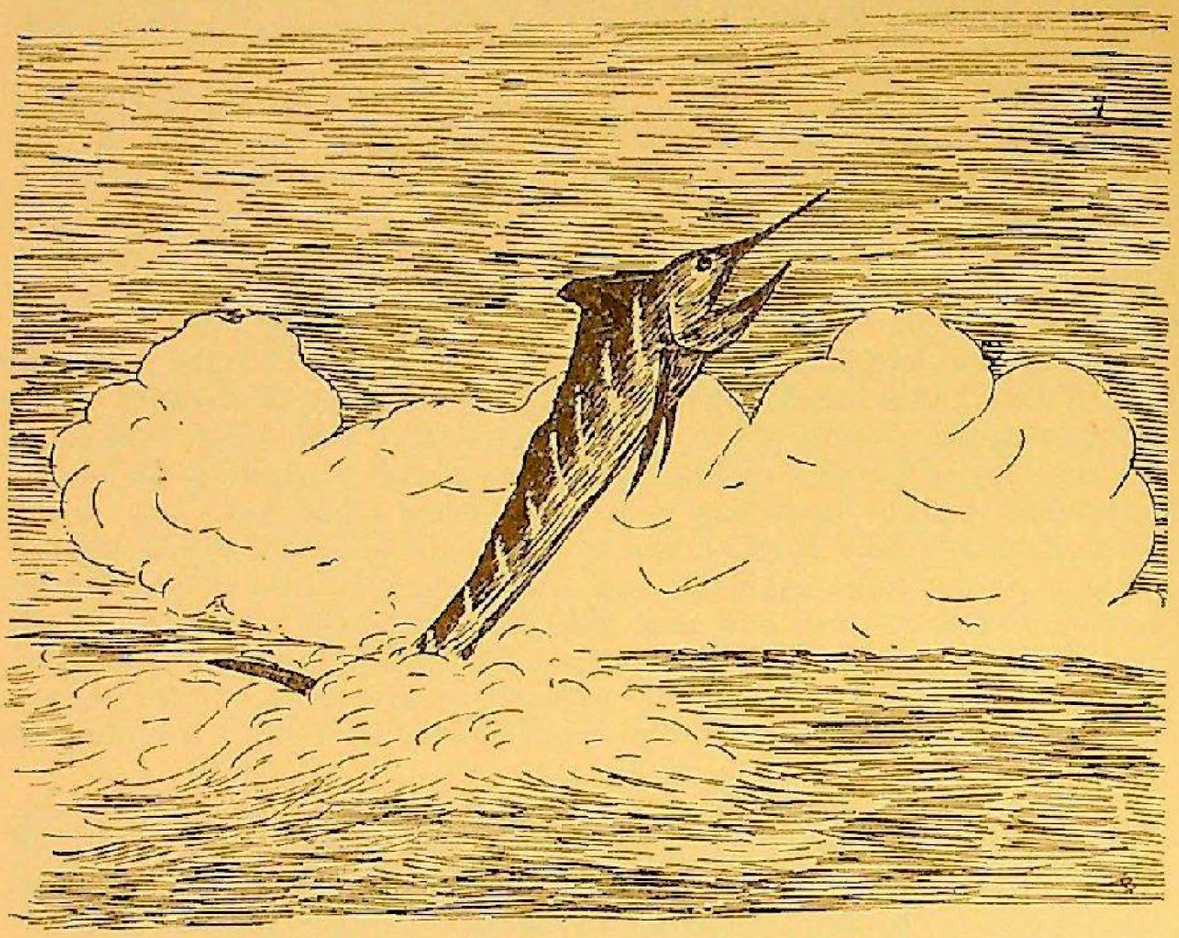

FIG. 76. Marlin jumping.

slender, sickle tails, weaving and shuttling, sliding down the swells. They are almost ghost-like. One minute there is nothing, the next they are all around you, and a minute afterward the sea is empty once more. And how they go! Run your boat full speed and you have all you can do to hold your own with them.

Unless he is feeding, lunging into a school of sardine or mackerel or anchovies, a marlin which is surfacing is hard to tease into taking a bait. Over at San Clemente Island I am sitting in my fishing chair with my bait perhaps 75 feet astern. We are running down the big afternoon westerly swells. As they pile up behind us I can see my bait precisely as though I were looking into an aquarium tank. There right behind it is a marlin weaving along, his pectoral fins extended like great wings, a shimmering bulk of changing color shot with imperial purple. He noses along just behind the bait, watching it, darting at it, slipping first to one side and then the other, dropping back, turning away, then coming up again. Reel up fast, drop the bait back, jerk it, it is all one to him. He is curious, that's all and it's a hundred to one he won't hit.

Most of the marlin strikes you will get are, as we call them, "blind ones" that is, with the fish not showing until just an instant before he strikes. Everything will be calm and peaceful; you are half asleep

under the caress of the sun and wind and the rhythmic "ka-chug-ka-chug" of your launch. Suddenly there is a flash of purple across your bait, a great roached and fluted fin rushes through the water with the sound of ripping silk. There is a sharp jerk and your line starts rushing off. "STRIKE! STRIKE!" you yell. The boatman tumbles down off the cabin where he has been keeping lookout and reverses the motor. The line still tears off the reel, then it pauses, and here is where you reel until you feel him heavy and strike hard three or four or half a dozen times to set the hook. I'll tell you why. A marlin seizes the bait cross ways in his mouth and swims away with it. When he has gone off about 75 or 100 feet he turns it and swallows it head downward. If, during that run, he feels the slightest pull, or the slightest prick of the hook, he drops it, and that's that.

All right—to get back. You have struck him hard, The water churns and boils. A slender wagging rapier thrusts out of the welter, threshing back and forth. A moment or two of this turmoil of broken water and out comes a slim, twisting shape, leaping high into the air, waving his head frantically, lunging back and out again. The line fairly smokes as it tears off. The great deep sea reel sings its snarling battle song. "WHRRRRRRR! WHRRRRRRRRRRR!" Your rod bends in arm-breaking, stabbing jerks. The boatman frantically swings

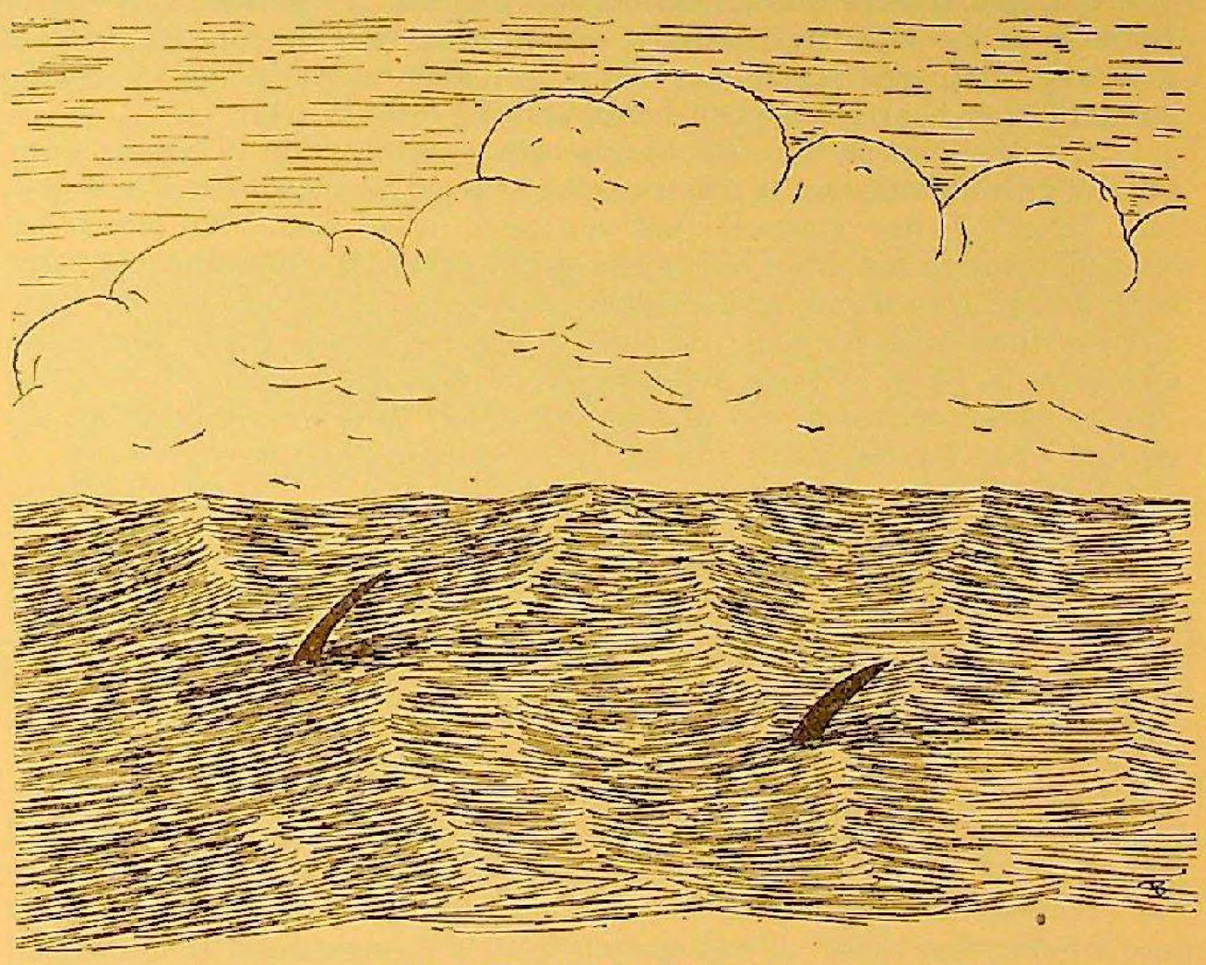

FIG. 77. Marlin surfacing.

the boat after that leaping, plunging shape before all the line is gone. He has been out 15 or 20 times already and seems to be just getting under way. He is so far away by now that he looks like a sardine. It is just impossible that that can be your fish. But it is, as the snarling reel

and racing line bear witness. However, such a show can't last forever. The leaps grow more labored; they are more like lunges now, desperate efforts to lift that furious body clear of the water and escape this maddening thing which holds him. But the flesh is weaker than the spirit. Wearily he lunges out once more and tries another course of action—sinking down, down, down until you think your back will break under that inexorable down drag. Then he starts off in some direction. It usually takes you a few minutes to figure out which, and you take after him, pumping and reeling (I mean by that, lifting the rod and dropping it sharply, picking up the slack as you drop) the light line cutting long gashes in the surface. After a time he seems to recuperate and starts toward the top again, breaking water 500 or 600 feet away. But that first run, that deep sounding has taken something out of him and he can only lunge part way out, beating at the leader with his sword, wagging his great head with its gaping jaws. You tighten up and go to work, and from then on it is just that very thing—work. Work such as you would never do for pay, but you spend money for the privilege of doing it.

Back and forth you have it. You drag him in within 100 or so feet of the boat and he tears out that hard earned line as though the great reel had no drag at all. But the end is approaching. Each time you get him a little closer, each time his run is shorter. Presently there he is 15 or 20 feet down, a shimmering, kaleidescope of color in a setting of filtered sunlight. Little by little you work him up within reach of your boatman's eager hand, and the fight is over.

Yes, the fight is over, but it has been a show while it lasted. Personally I think a marlin is a more stout-hearted warrior than the broadbill. Don't flatter yourself that you have killed him. He has killed himself through his desperately brave efforts to free himself; his great heart has broken through sheer exertion.

So, there it is for you. Broadbill versus marlin. Both gentlemen adventurers, stout fellows, with hearts of tempered steel. Take your choice. You will make no mistake in either case but, just as a suggestion, cross swords with both and you'll be glad you have lived.

Adios!

MORE ABOUT THE QUAIL REFUGES

By Gordon H. True, Jr.

SOMEWHAT MORE than a year ago, the Division of Fish and Game sent representatives into the southern part of the State to determine whether or not the now sadly depleted ranks of a once numberless army of valley quail could be returned to their full strength, or at least to something resembling it.* Although the period of time that has elapsed since the project had its inception has been far too short to enable the setting forth, here and now, of the answer to the quail question; still, progress is being made. So, in order that

* True, Gordon H., Jr. The Quail Replenishment Program. CALIFORNIA FISH AND GAME, Vol. 19, No. 1, January, 1933.

those who are interested in this work may keep in more or less intimate touch with it, it has been deemed wise to comment from time to time upon its various phases. By so doing we shall at least provide some food for thought among those who, with us, seek to perpetuate the sport of upland game bird shooting through production, rather than through the reduction of bag limits and the shortening of seasons. The subject matter contained in this paper shall relate primarily to the liberation of game farm reared quail and the processes involved therein.

The first liberation of artificially propagated valley quail, in connection with this program, was accomplished on a quail refuge near Romoland, in Perris Valley, Riverside County, on July 23, 1932. Since that time and up to the twenty-third day of September, 1933, 7191 valley quail and 733 Gambel quail have been "planted" on various State-maintained sanctuaries in Los Angeles, Riverside, San Bernardino and San Diego counties.

Throughout the 1932 season the birds were transported from the game farm and planted directly to cover; that is, upon reaching a designated destination the crates were opened and the birds released without further ado. We wanted to begin with this simplest of liberation methods, and note the results. We wanted to determine whether or not it would be necessary to adopt some more involved and painstaking method of procedure. We found that the direct method wouldn't do in most instances. As one observing game warden expressed it, "You can't raise a bird like a king and kick him out like a tramp." At any rate some of the birds so liberated took one look at their new surroundings, turned up their noses and set out for the

FIG. 78. Holding pen on City Ranch Refuge, Antelope Valley. September 19, 1933. Photo by G. H. True, Jr.

nearest habitation; man-made structures, in their language, spelling food and shelter. One newly liberated covey roamed over a distance of some six miles the first day and, the next morning, was found at a service station, the only building of any kind in the vicinity. If

reference were being made to human beings, it could be said that their faces wore lean and hungry looks. No, the "direct to cover" method wouldn't do at all. So the use of holding pens was resorted to.

Fig. 79. Transferring quail from crate to holding pen. City Ranch Refuge, Antelope Valley. September 19, 1933. Photo by G. H. True, Jr.

The holding pen that is being used throughout the present quail liberation season covers an area 12 feet in breadth and 14 feet in length. It is 30 inches in height. The sides are solidly constructed of one-inch redwood boards, three of them, and the top of each pen is made up of three panels of wire mesh stretched upon frames of one-by-four material. In one of the twelve-foot end panels there is a door for use in transferring the birds from crate to pen. The pen is of what may be termed the knock-down variety and may be taken down in only a few minutes, loaded on a small truck of the pick-up type and transported to a new location. Within fifteen minutes after the truck arrives at a chosen spot, the holding pen is bolted together and ready for occupancy.

When the birds arrive from the game farm in specially constructed crates, they are placed in the pen at once. The maximum capacity has been fixed at 200 valley quail, though a few more may be admitted if they are not held for too long a period. Food and an abundance of fresh water are provided for the birds and they are then left to their own devices for a time, usually for at least 24 hours. At the close of the first day a few birds are released and so on, day after day, until the pen has been emptied of its feathered occupants. The best results have been obtained by extending the liberation period over a minimum of four days. In some instances an entire week has elapsed before the last bird has gained its freedom. The birds are allowed to leave the pen through the top, one of the top panels being removed, rather than through the side door.

The birds in the pen are, of course, fed and watered each day. In addition, some feed is scattered outside of the pen and water is sometimes placed in the immediate vicinity. The latter is not often necessary, however, since the holding pens are almost invariably so placed as to be immediately adjacent to some permanent water supply.

Quail that have been released from the confinement of a pen appear loath to leave the immediate neighborhood while their companions are still incarcerated. They may be observed at almost any hour of the day walking about over the wire top covering and uttering at intervals the low, anxious *whit whit* call, so characteristic of the species. This works to our advantage, for, during the time that these birds are lingering about, voicing solicitude for their imprisoned mates, they are gradually becoming accustomed to this strange new world. They have found and have, nightly, become established in certain roosting places. They have learned that the plump, three-cornered grains of the wild buckwheat and the spiraled seeds of the filaree plant, constitute a banquet fit for a king. They may have learned these things all the more quickly from some of their wild brethren that have managed to escape the hunter to make them welcome. In any event, when the last bird has attained its freedom, a covey has become established.

Even now, however, the birds are not thrown entirely on to their own resources. A few handfuls of feed are thrown out at each point of liberation, whether the pen has been removed or not, twice each week. These bi-weekly feedings are not intended to maintain the birds, but as a supplement to the natural food and to hold the birds in a desired area. This procedure will be followed until the first fall rains, at which time an abundance of green food will be available and will make further feeding unnecessary.

FIG. 80. Gambel quail at feeding time. Orde Mountain Refuge, Mojave Desert. September, 1933. Photo by O. M. Lau.

Throughout the liberation period, it behooves the attendant gamekeeper to be watchful. Coincident with the establishment of a holding pen comes an army—small to be sure, but nevertheless well armed—of predators. Cooper hawks, by ones and twos, drift into the area to gaze longingly at the plump prizes beneath the protecting wire, or to dart

swiftly upon some luckless individual who knows not what that rush of wings portends. With the Cooper hawk comes a lesser number of a near relative, the sharp-shinned hawk, and (the author admits the heresy) all too frequently the redtail. At night, as the pole traps placed at each pen mutely testify, comes the horned owl with several of his cousins. Among the mammals, the weasel and the little spotted skunk, constitute the greatest menace, and traps must be set for them. Even then, a pen must be well put together to prevent the wanton slaughter of its inmates. As the result of at least one harrowing experience, each pen has been provided with an eighteen-inch strip of wire mesh, tacked to the lower edge of the bottom boards on the outside. A trench is then dug and the wire buried therein, well covered with earth and stones. So far, this method has circumvented any attempts at digging in by predatory mammals.

Quite different from the "direct to cover" method—this making use of holding pens; but, as the presence of coveys at each point of liberation where it has been done will testify, it is far superior.

A STEELHEAD MIGRATION IN SHASTA RIVER

By J. O. Snyder

FOR SOME TIME, the Bureau of Commercial Fisheries in connection with its salmon investigation has been taking an annual census of the salmon which migrate into Shasta River from the main channel of the Klamath. This work was in the hands of Merrill Brown, and had for its purpose, among other things, an evaluation of natural propagation when sufficiently protected.

Last year, the period of observation was lengthened to include as much of the steelhead run as possible. The latter begins, rises and waxes as the salmon run wanes. Some conditions of more than passing interest appear in connection with the steelhead migration.

The water at the mouth of the Shasta is clear enough to permit a view of the passing fish, but at times they come in such numbers as to make necessary a more accurate means of observation. To meet this need, a rack was constructed across Shasta River near its mouth. Two counting gates were built in this barrier, through which the passing fish were lead over a white apron. The observer, seated above one of these, had no difficulty in distinguishing the steelheads, and the enumeration proceeded with accuracy.

Carleton Rogers is to be credited with the steelhead count and the following notes were gleaned from his report.

At night, the gates were kept closed, as it was learned that few fish moved after darkness set in. It also became apparent that a real migration did not appear until after noon.

On September 19th, the first fish was recorded, and before October 10th, only 15 were observed. From then, the migration went on as the following table illustrates:

Date	No. Fish	Temperature F. Klamath River	Shasta River	Weather
Oct. 10	5	62	60	Clear
11	5	61	58	Clear
12	26	60	58	Clear
13	44	60	59	Clear
14	23	63	61	Clear
15	44	63	60	Rain
16	11	60	57	Rain
17	55	58	54	Cloudy
18	25	57	54	Rain
19	14	57	53	Clear
20	8	57	52	Clear
21	17	57	54	Cloudy
22	27	25	52	Rain
23	4	54	51	Clear
24	12	54	51	Clear
25	11	55	52	Clear
26	13	54	52	Clear
27	33	55	52	Clear
28	18	54	52	Clear
29	35	53	51	Clear
30	2	51	50	Clear
31	1	54	49	Cloudy
Nov. 1	36	52	50	Cloudy
2	59	50	48	Cloudy
3	0	50	49	Clear
4	7	47	46	Rain
5	11	50	49	Rain
6	285	52	52	Rain
7	10	49	49	Cloudy
8	6	49	50	Cloudy
9	283	51	50	Clear
10	9	49	48	Clear
11	1	48	47	Clear
12	0	48	50	Clear
13	0	48	48	Cloudy
14	459	49	49	Cloudy
15	43	48	46	Rain
16	184	51	49	Cloudy
17	703	51	52	Clear
18	2675	50	49	Fog
19	255	49	50	Fog
20	16	48	50	Fog
21	77	48	48	Fog
22	0	46	47	Fog
23	25	47	47	Clear
24	1	47	48	Cloudy
25	58	48	49	Clear
26	14	48	47	Cloudy
27	112	47	51	Rain
28	2124	48	53	Cloudy
29	553	46	51	Rain
30	21	47	50	Clear
Dec. 1	15	47	48	Fog
2	30	48	48	Fog
3	1	47	46	Fog
4	0	45	44	Fog
5	7	45	44	Fog
6	0	45	44	Cloudy
7	0	42	39	Cloudy
8	0	38	35	Snow
9	0	40	33	Clear
10	0	38	33	Clear

It will be noted that migration progresses not as a steady wave of increasing magnitude, but by a series of irregular spurts which rise to a maximum after the middle of November. This peculiarity, common to most animal migrations, is graphically shown in Figure 81. The rack went out of use on December 10th, but the mass movement of fish was then apparently over.

Between September 19th and December 10th, 8525 fish were counted. During this period, winter was approaching, both air and water were rapidly cooling, and cloudy and stormy weather came apace. The afternoon temperature of the Klamath River fell from 72 to 38 degrees F., while Shasta River went from a like temperature

to 33. During the early part of the migration, fish were constantly passing from warmer to colder water, but on the sixth of November, the temperatures of the river and its tributary were equalized without arresting the migration. After this date, the early condition was reversed at times, the Shasta becoming warmer and the fish passing from cooler to warmer water.

A summary discloses that of the 8513 migrating trout, 974 passed from warmer to cooler water, 1075 moved on even temperatures, while 6464 went from colder to warmer water.

It will be recalled that these migrating trout, starting from the sea, have progressed over a long distance and passed the open mouths of many tributary streams, several of which are larger than the Shasta, to finally select and enter this particular branch. Temperature has been ascribed as the factor in determining the selection of tributaries in the case of certain migrating salmon in Alaska, and had an observer taken occasional temperatures during the early part of this trout migration, a similar conclusion might have been reached. Continued

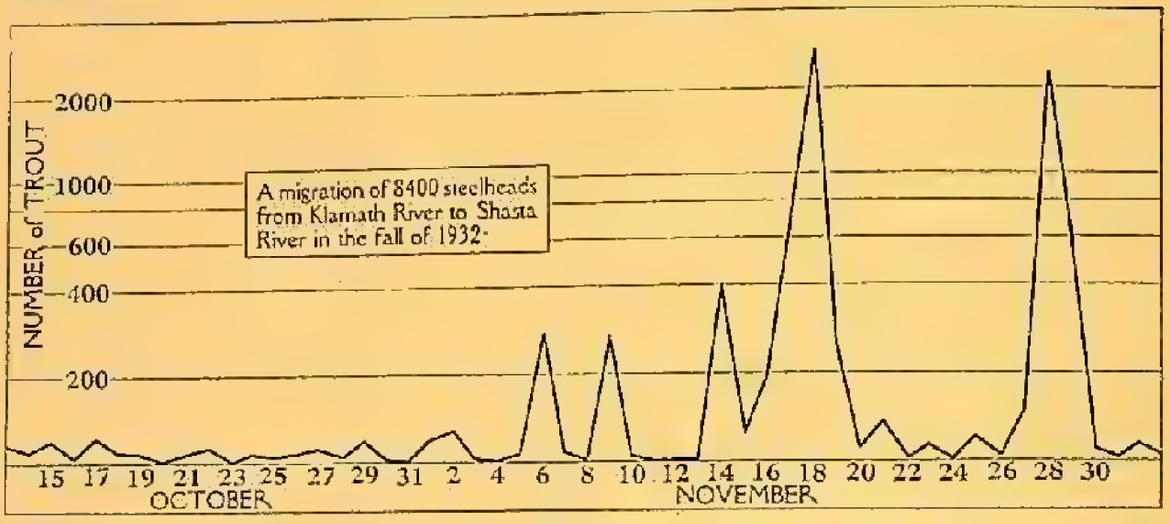
NUMBER of TROUT
2000
1000
600
400
200
A migration of 8400 steelheads from Klamath River to Shasta River in the fall of 1932
15 17 19 21 23 25 27 29 31 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
OCTOBER
NOVEMBER

FIG. 81.

observation in this case puts temperature in the discard as appears. It might be remarked also, that observations on the movements of king salmon at this same place do not support a temperature thesis for that species.

As the season and likewise the migration advanced, the weather became unsettled and at times stormy, the work being brought to an untimely close because of the formation of ice during a severe cold snap. It may be noted that during all the clear days, 24 in number, 1353 fish migrated; during 13 cloudy days, 2966 passed; while through 10 foggy days, 3076 moved; and in 10 rainy days, 1118 fish passed. During 33 dark days, 7160 fish migrated. While the character of the day may have influenced movement, it very evidently had nothing to do with the selection of this particular tributary.

Steelheads appear in the Shasta and begin their spawning operations long before they do in several other tributaries of the Klamath which enter the main channel both below and above the Shasta. In cases where observations have been made, the migrations are similar in that they progress in a series of lesser waves, the cause or contributing factors of which are not known.

THIRD ANNUAL BLACK BRANT CENSUS IN CALIFORNIA

By James Moffitt, Economic Biologist, Division of Fish and Game

THE FIRST ANNUAL census of black brant (*Branta bernicla nigricans*) was taken by the California State Division of Fish and Game employees and voluntary cooperators February 6 to 12, 1931, and was reported in California Fish and Game, vol. 17, 1931, pp. 396–401. The second annual census was made February 10 to 12, inclusive, 1932, and was reported in this publication, vol. 18, 1932, pp. 298–310. The third annual count of black brant in California waters was made February 11 to 13, inclusive, 1933, and results of this census are hereby recorded.

For various reasons the results obtained in 1933 are regarded as less satisfactory than those secured in the previous year when excellent counts were obtained at all points. It is particularly regretted that due to unavoidable circumstances arising at the last moment, the writer was unable to undertake a census at Morro Bay, and insufficient time prevented making arrangements to have a count made at this point by another. Hence, our 1933 census lacks data from this important area.

The writer took the census on Tomales Bay, February 13, 1933, when conditions for obtaining a satisfactory count were found to be less favorable than in the previous year when a very accurate census was obtained. This year the brant were nearly all found associated with enormous numbers of gulls, cormorants and surf scoters within the rather limited area of "Inner Tomales Bay" between Tom's Point and Blake's Landing (see map, California Fish and Game, vol. 18, 1932, p. 301). In addition to the 6868 black brant counted within this area, there were present at least 3000 gulls, 500 cormorants (mostly Brandt's, *Phalacrocorax penicillatus*, and approximately 100 Farallon, *Phalacrocorax auritus albociliatus*), and 4000 surf scoters (*Melanitta perspicillata*). This quantity of moving birds, closely intermingled with the brant as they were, greatly complicated counting the geese. The dark bodied cormorants and surf scoters were particularly annoying in this respect on account of the difficulty of distinguishing them from brant. These birds, brant, gulls, cormorants and ducks, were quite evidently attracted to this portion of Tomales Bay that day by enormous numbers of Pacific herring (*Clupea pallasii*) that were spawning in this part of the bay at that time. In fact, so engrossed were the gulls in gathering herring spawn and snapping up the fish themselves that were continually being driven to break the surface of the water in schools by pursuing fish and cormorants, that I was able to run my noisy outboard motorboat directly through large aggregations of gulls, the least timid of which would merely swim a few feet aside of the boat's bow. The brant and scoters, which were feeding upon the herring spawn, were more wary and usually took flight when

the boat was about one hundred yards distant. Of the 3000 gulls that I estimated were feeding here, fully 92 per cent were glaucous-winged (*Larus glaucescens*), of which 85 per cent were immature birds. The remaining gull population consisted of approximately 5 per cent short billed gulls (*Larus canus brachyrhynchus*) and 3 per cent western herring gulls (*Larus argentatus smithsonianus*). It is notable that no single individual of the western gull (*Larus occidentalis occidentalis*), which is the common breeding gull of this region and is supposedly resident, was seen. In addition to the 6868 black brant counted

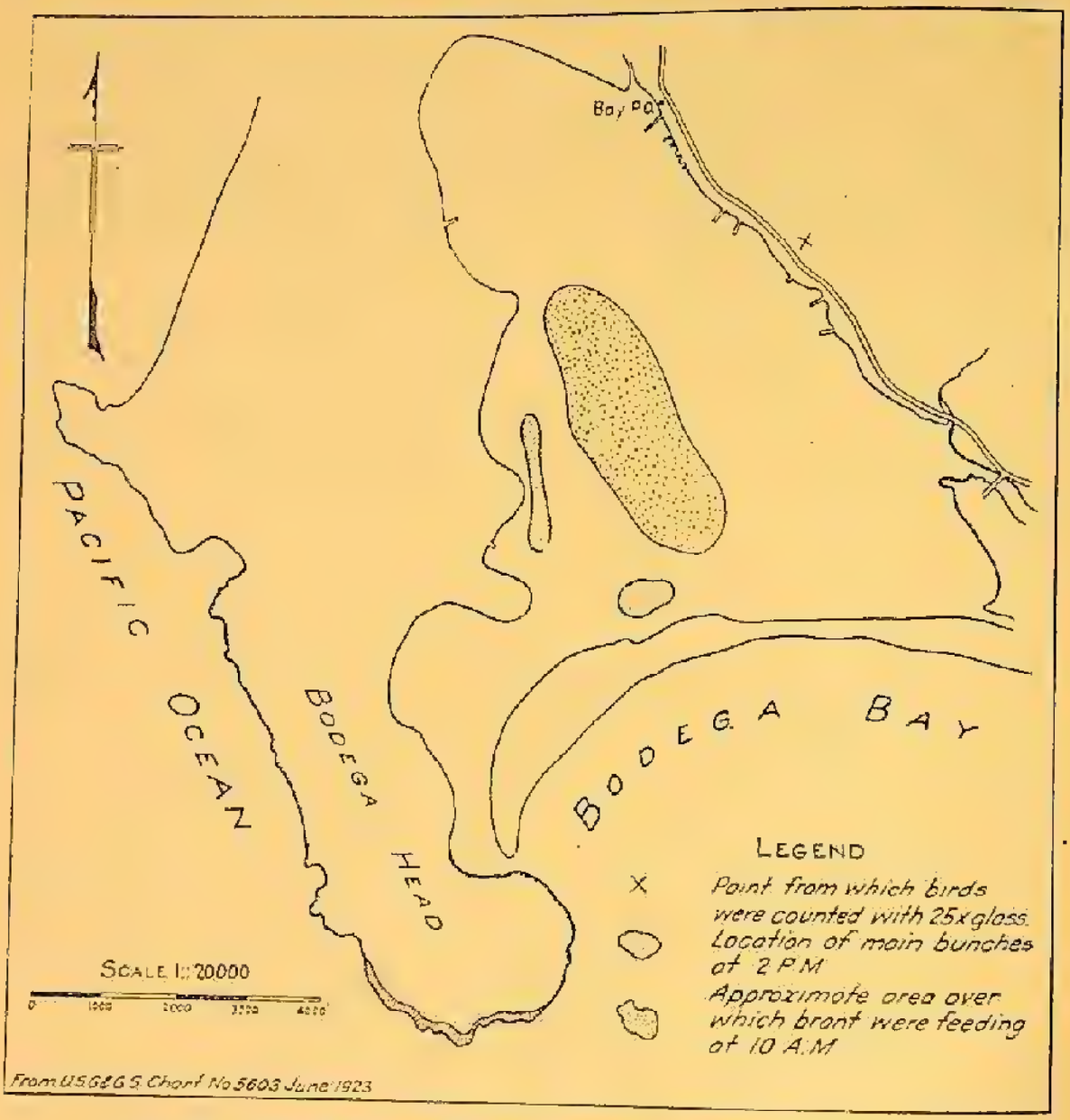
Bay Point
PACIFIC OCEAN
BODEGA HEAD
BODEGA BAY
LEGEND
X Point from which birds were counted with 25x glass. Location of main bunches at 2 P.M.
Approximate area over which brant were feeding at 10 A.M.
SCALE 1:20000
From U.S.C.&G.S. Chart No 5603 June 1923

FIG. 82. Bodega Bay and Vicinity, Sonoma County, California.

February 13, 1933, in the area above designated, but 541 birds of this species were seen elsewhere on Tomales Bay. Of these, 253 individuals were noted along the eastern shore of the bay between Cypress Point and Hamlet and 288 birds were found in the "Outer Bay." (Contrast distribution of brant on Tomales Bay this date with February 11, 1932. See Fig. 73, CALIFORNIA FISH AND GAME, vol. 18, 1932, p. 301.)

The census taken on Tomales Bay February 13, 1933, was commenced at 9.30 a.m. and completed at 2.15 p.m. The tides on the bay that day were as follows: Low Water, 7.15 a.m., 1.5 feet; high water,

1.18 p.m., 4.9 feet; low water 7.20 p.m., 0.8 feet. The weather was clear with a light northwest breeze until one o'clock after which same stiffened to produce quite "choppy" water, but this was too late to interfere with census taking. I estimate that the 1933 count on Tomales Bay is 75 per cent accurate.

Dr. Jean Linsdale, University of California Museum of Vertebrate Zoology, Berkeley, California, again counted the brant on Bodega Bay, February 11, 1933. This is the second year that Dr. Linsdale has cooperated with the Division by making a census of the brant on the waters of Bodega Bay on this date, and we greatly appreciate this assistance. In 1933, Dr. Linsdale found 977 brant feeding on the bay at 10.30 a.m., in the area indicated on the accompanying map (see Fig. 82). By 2 p.m., the birds had finished feeding and were loafing in "bunches" in the areas shown in the same figure. Dr. Linsdale secured his count by means of a 25 power telescope from a point near the town of Bay. The tides on Bodega Bay, February 11, 1933, were approximately as follows: low tide, 5.09 a.m., 2.3 feet; high tide, 11.12 a.m., 5.6 feet; low tide, 5.51 p.m., —0.1 foot. It should be noted that Dr. Linsdale counted 3200 black brant on Bodega Bay, February 11, 1932. We have no means of ascertaining whether the very much lower count obtained in 1933 was occasioned by later arrival of the birds this spring, or by the fact that a large proportion of the brant normally occupying Bodega Bay were elsewhere; for instance, in Tomales Bay or on the ocean between the two bays at the time the 1933 census was taken.

T. T. McCabe, Berkeley, California, who took the 1932 census on Drakes Bay on February 11, again most generously donated his services his year and made a count of the black brant in these waters the same date in 1933. His total for 1933 was but 318 birds contrasted with 2108 counted in the same area the previous year. The large reduction in numbers of birds on Drakes Bay this year over a year ago is in agreement with Dr. Linsdale's findings on Bodega Bay, but is contrary to my experience on Tomales Bay where 6285 black brant were counted February 11, 1932, and 7409 birds on February 13, 1933. Perhaps the exceptional feeding conditions obtaining on Tomales Bay at census taking time this year and described above also existed there two days earlier and resulted in some of the brant normally frequenting Bodega and Drakes bays moving to the nearby and intervening Tomales Bay. It is indeed regrettable that I was unable to take the Tomales Bay census on February 11 as planned, at the same time Linsdale and McCabe made their counts, in order that no shifting of the brant population could occur and affect the accuracy of our combined censuses for this region. Tides on Drakes Bay February 11, 1933, were substantially the same as those listed above for Bodega Bay. McCabe found all of the brant he noted on Drakes Bay in 1933 on the lower half of the bay where they were scattered in companies ranging from 4 to 187 individuals (see Fig. 74, CALIFORNIA FISH AND GAME, vol. 18, 1932, p. 302).

The 1933 brant census on Humboldt Bay was taken by Mr. C. I. Clay, Eureka, California, and Game Warden J. F. Hurley, February 12, 1933. This date was exactly a year following the 1932 count which was made by Clay, W. J. Harp, of this Division, and the writer.

Unfortunately, an injury prevented Harp assisting with the 1933 census and the writer was also unable to cooperate. Clay advised the results of the census and stated that light rain and a northwest wind, coupled with Hurley's inexperience with the outboard motor we used in 1932, prevented taking the census by boat and it was therefore made from shore with the aid of a glass. Clay reported the results obtained as follows:

"There seemed to be no birds whatever off the south side of Arcata Bay, but in the lee of the Arcata wharf, one mile out from the shore line we observed several patches of birds which both believed without doubt were brant; probably around 500 birds. We then drove through Arcata and around to the mouth of Mad River slough, mounting the high sand dunes. At that point we had a fine view looking over the water and many brant were in view. It was not hard to count them through the glasses. Two extensive flocks were lying near this point; estimated count 2000 birds equally divided. At a distance between our position and the Arcata wharf were lying in a scattered line considerable numbers of birds riding a rather choppy surface, with small numbers flying from and to alternate positions along the line.

"We then drove on toward Samoa and took up a point of vantage at the place Harp, you and I observed the western most point of brant on the north bay (in 1932). This was also about the end of the line extending towards Arcata. It of necessity must be but an estimate, still the scattered line was continuous and probably accounted for our maximum estimate of 2000 birds. This seemed to be North Bay's quota. (In addition to the two, 1000 count flocks and 500 at wharf.)

"We then went to Fields Landing, driving directly out on the wharf but did not observe a bird from there that could be called a brant. There were none either north or south of the wharf, where you and I counted hundreds before. The water was choppy and the sky overcast and gray. We then drove on around and upon Table Bluff at a high vantage point and by this time the water had become smoother and the sky lighter. Our glasses gave a very excellent view and we did not see a single brant, although scoters, ducks and gulls were easily segregated at a distance. From there we went down on the Phelan Ranch right to the water's edge near the mouth of Hookton Slough. Considerable numbers of ducks were to be seen east of this point, a few westward, but not a single brant was in evidence.

"We could see small scattered strips of birds lying along the peninsula on the edge of the waterline, which were no doubt brant and our estimate for all of South Bay would not exceed 500 birds.

"Summing the whole thing up, North Bay harbored 4500 brant, South Bay 500 brant, totaling 5000 birds.

"It was not but a couple of weeks later when brant began coming onto South Bay and inside of a month there were thousands of them there, although no count of them was taken.

"Late in March the birds started thinning out and during a couple of weeks it seemed as if they would all leave the bay. Probably they

did, but others must have come in to take their place, traveling from points farther south; for on April 12, 1933, there must have been two or three thousand brant along a line extending north and south from Fields Landing to Hookton, out in the open water."

The writer visited Humboldt Bay March 4 and 5, 1933. The afternoon of March 4, Captain of Game Wardens Harp and the writer drove along the eastern shore of Arcata or North Humboldt Bay where we noted numbers of brant, probably totaling two or three thousand birds. I inspected the waters of South Bay with Game Warden Hurley early on March 5 when observations of its glassy surface were made from Table Bluff. Many groups of brant were recognized without difficulty. It was hard to estimate their probable numbers in the limited time at our disposal, but certainly between five and ten thousand of these birds were present. These observations, coupled with Clay's remarks in the second paragraph above, indicate that for some reason brant were exceptionally late in arriving at Humboldt Bay in numbers in the spring of 1933.

The tides on Humboldt Bay February 12, 1933 were as follows: low water 7.13 a.m., 1.8 feet; high water 1 p.m., 6.1 feet; low water 7.36 p.m., 0.1 feet. For map of this vicinity see CALIFORNIA FISH AND GAME, vol. 18, 1932, p. 300.

Mr. L. M. Huey, of the San Diego Natural History Museum, cooperated for the third time by making a census of the brant on Mission and San Diego bays on February 10, 1933. This year, Huey writes, no brant were found on San Diego Bay although he states he spent most of his time there. However, two bunches, one of 28 and the other of 87 brant were observed on Mission Bay. Reference to the table below will indicate that this is the largest number of birds found in the San Diego region in any of the three counts.

Recapitulation of the 1931, 1932 and 1933 Black Brant Censuses

Locality	*1931*	*1932*	*1933*
Humboldt Bay	Unsatisfactory	29,415	5,000
Bodega Bay	None made	3,200	977
Tomales Bay	9,445	6,285	7,409
Drakes Bay	None made	2,108	318
Morro Bay	4,493	2,938	None made
Mission Bay	71	No birds	115
San Diego Bay	No birds	No birds	No birds

FALL OCCURRENCE OF BRANT ON TOMALES BAY IN 1932

The writer made a number of visits to Tomales Bay during the shooting season, November 1 to December 31, 1932. On each of these trips particular notice and estimates were made of the quantity of brant present. Although in no case was an exact count taken, the estimates made were rather careful ones and will serve well to indicate the abundance of the species in the region over the period in question.

The first visit was made November 16 when but approximately 175 brant were seen. Residents at the bay said that they had noticed no brant prior to this date. That some birds, however, were in the vicinity many days previous is attested by the fact that some friends shot two brant on Drakes Bay on November 1. The following table provides the

approximate number of brant noted by me on Tomales Bay in the fall of 1932:

November 16	175
November 26	350
December 2	1750
December 6	3250
December 17	4000
December 20	5000
December 21	5000
December 23	5000
December 30	6000
December 31	6000

BRANT OCCURRENCE ALONG THE PACIFIC COAST

In connection with my report on the second brant census, I discussed in some detail the occurrence of this species elsewhere along the Pacific coast (*op. cit.* p. 307). Furthering my desire to place on record all pertinent available information with reference to the distribution and abundance of this species in America, I have in the past year acquired considerable additional data that will be recorded herewith. I wish to acknowledge most gratefully the kindness and cooperation that the sources of this information have rendered me by cheerfully furnishing same with permission to print. Data with sources for same are listed geographically as follows:

Melville Island (situated between 105 degrees and 118 degrees west longitude and approximately 75 degrees north latitude).

P. A. Taverner writes, "Both black and light-breasted brant (*Branta bernicla Hrota*) occur and probably nest on Melville Island where Hennessy collected them."

Point Barrow, Alaska. In conversation with my friend, Charles D. Brower, of Barrow, Alaska, he stated that "light-bellied brant" are by no means rare in this locality. Brower said that hunters kill both kinds in their fall shooting but that the black form always greatly outnumbers the light-bellied one. He did not specifically recall ever having seen the light-bellied bird there in nesting season, or in spring; but was under the impression that he has.

British Columbia Coast. J. A. Munro, Chief Federal Migratory Bird Officer for the Western Provinces of Canada, wrote me as follows: "The brant shooters of Vancouver insist that there is practically no shooting until late December, and that the biggest concentrations are in February.

"There are numerous wintering bands, widely separated, on the British Columbia coast.

"I am told the species winters on the Queen Charlotte Islands, on both coasts of Vancouver Island and at various places on the mainland west."

Major Allan Brooks, in conversation, recently related his views on the British Columbia brant population as follows (all remarks pertain to the black brant, *Branta bernicla nigricans*): It is confined to the presence of eel grass where not too badly disturbed. Present in Nanaimo Harbor. No longer resorts to Burrard Inlet where it was formerly common. Now common at Nootka where it formerly did not occur. He does not know the northern winter limit of the species, but stated that it appears to be holding its numbers well and few are shot.

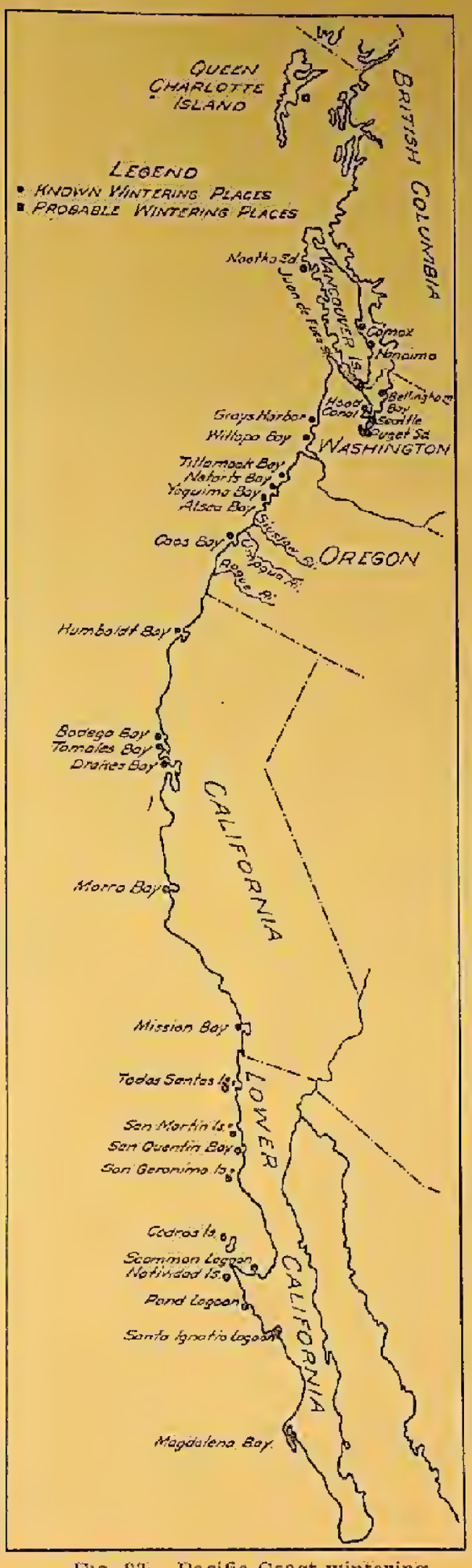

FIG. 83. Pacific Coast wintering places of black brant.

Concerning its migration and time of arrival, the Major said it appeared in fall late in October, never arriving before the 20th which is the earliest date upon which he has recorded it. Usually brant put in an appearance about October 25. Maximum numbers are reached about the end of November and remain about constant from this time until the beginning of May. Usually the birds commence "thinning out" in the first ten days of this month, but in 1931 they were still common on May 13.

Major Brooks made the following remarks concerning the occurrence of the light-bellied brant, *Branta bernicla Hrota*, in British Columbia: In 1903, light-bellied brant were fairly numerous in Comox harbour. None were seen until December, although Brooks had been shooting brant for a month previous. Later that winter, he estimated that the species formed 8 per cent of the brant population in the region. He says that one day, he killed a whole family of the light-bellied brant at Comox, composed of an old goose and four young of the year. Since 1903, Brooks has frequently noted this species at Comox where he considers it to be a quite common winter visitant.

Washington. A recent letter from Mr. Lou Ovenden, Director of the Washington State Department of Game, advises that although black brant visit the coast of Washington during migrations, the Department has no data as to their numbers or times of arrival and departure. Mr. A. S. Einarsen of the Department, however, is studying the Washington brant situation this season and will secure much information on the subject that Mr. Ovenden has generously offered to provide for use in a future paper on the species in this publication.

Mr. S. F. Rathbun, Seattle, Washington, in reply to a recent request for information on the subject, most kindly wrote as follows under date of October 16, 1933:

"*Localities where either found or seen:* Along the ocean coast of this State this brant is found more often about Gray's Harbor, less so in Willapa Harbor, and also at times in flight along the coast.

"Bellingham Bay: 'Common on the salt water in winter.' (Birds of the Bellingham Bay Region, by J. M. Edson).

"Skagit Bay: Saratoga Passage and adjacent waters, all lying east of the eastern end of Strait of Fuca; Admiralty Inlet. These may be called ramifications of the Strait, all connecting with Puget Sound.

"Hood Canal, the western arm of Puget Sound.

"Strait of Fuca, in these waters brant are invariably seen, and near Dungeness on the Strait is one favored locality.

"Smith Island, and its extension Minor Island: About this locality and at the north and northeast into Rosario Strait is, we think, the general locality most favored by the black brant. These two islands lie in the eastern end of Strait of Fuca.

"Puget Sound: Brant are seen the length of the Sound, but more often in its lower part. Have seen it in the sound opposite Seattle, and the first one we ever took was just south of the city.

"*Concentration*: The largest concentration during winter seems to be in the general area about Smith Island and some distance north. At this time, brant are to be seen there in numbers.

"Think there is also a light concentration in Skagit Bay and Saratoga Passage, for some brant can always be found here during the winter.

"Quite likely a light concentration in the locality about Dungeness on the Strait. This has some reputation as a hunting ground for brant.

"At various times during the winter, brant are found in Gray's Harbor. There may be a slight concentration here.

"But beyond any doubt, the main concentration is in the general area near Smith Island, this extending into Rosario Strait.

"*Flight:* This brant appears to arrive from the north around November 10 to 15.

"Think its spring movement begins late in March. This continues throughout April, straggling into early May. Our latest record of any seen is May 10, this along the ocean coast north of Gray's Harbor.

"*Numbers*: No estimate in this respect has ever been made by myself."

Oregon. Mr. Ira N. Gabrielson, U. S. Bureau of Biological Survey, Portland, Oregon, provided the following information relative to black brant occurrence in that State:

The species winters along the Oregon Coast as follows: Tillamook Bay, where largest concentrations sometimes number from four to five thousand birds; Yaquinna Bay contains numbers second only to Tillamook; Coos Bay, which is third in importance and on Netarts Bay. Gabrielson stated that the following are localities where brant should occur and data from them are greatly desired: Flores Lake at the mouth of the Rogue River, the mouth of the Umpqua River, Siuslaw River and Alsea Bay.

Gabrielson visited Tillamook Bay January 28, 1933, where he found approximately 1500 brant. He ascertained that the birds had just started to arrive there and averred that these were the first brant seen by him along the Oregon Coast last winter. This late date of arrival to the State north of us corresponds with the late appearance of brant on Humboldt Bay and furthers the writer's theory. (*See* CALIFORNIA FISH AND GAME, vol. 18, 1932, pp. 305–307), that our main spring concentration of brant reaches us from the south.

CONCLUSION

The third annual brant census in California was somewhat unsatisfactory as far as results obtained are concerned. However, figures from several points where censuses were also secured in the two preceding years indicate that the birds were unusually late to reach our waters in numbers this year. It should be pointed out that rather large fluctuations in numbers are to be expected in this census work from year to year, and it will only be after we have the records for a number of seasons at hand that the results can be intelligibly interpreted. Therefore, we will again make a brant census in 1934 and hope in this or following years to see similar counts undertaken in other Pacific Coast States.—*October 20, 1933.*

OPERATION OF A CALIFORNIA SHRIMP TRAWL*

By D. H. Fry, Jr.

THE CALIFORNIA shrimp catch is all taken in San Francisco Bay with two kinds of gear—beam trawls and the tide-operated Chinese shrimp nets. Bonnot in his report ("The shrimp industry of California"; Calif. Div. Fish and Game, Fish Bull. 38, 1932) describes both kinds of gear and explains the operation of the Chinese nets. Mr. William F. Petersen, a Marin County shrimp fisher-

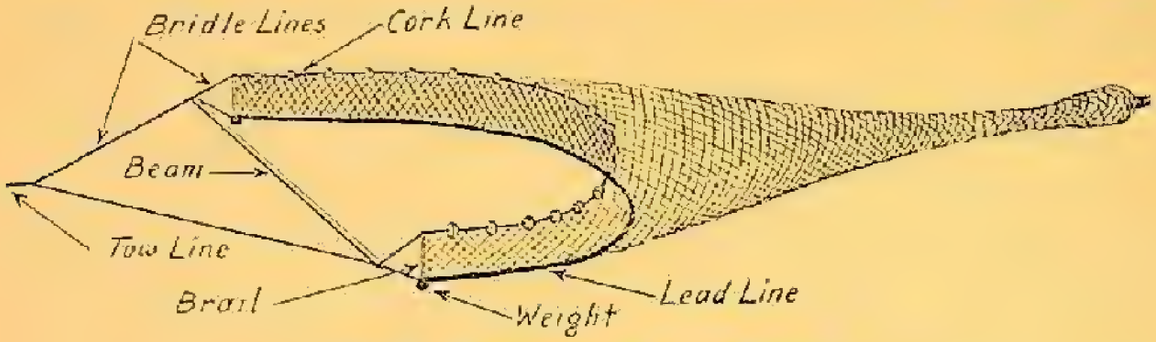

Fig. 84. Diagram of shrimp trawl.

man, was kind enough to take me out and show me how the beam trawls are operated.

Most of the boats used for shrimp trawling are the same type of one-man fishing boat that is seen all over the State. Approximate specifications of these boats are: length, 25 to 30 feet; beam, about 8 feet; highly crowned deck; flaring bows; pointed at both ends; a small house; and a 6- or 8-horsepower engine. They are known as jigboats in southern California and salmon trollers in the northern part.

The beam trawls are about 60 feet long and 20 by 2½ feet at the mouth. They are shaped like a rectangular-mouthed funnel, with 20-foot "wings" attached to the mouth along the short sides. A 2½-foot pole (brail) at the end of each wing helps to keep the top of the net off the mud, and a 20-foot pole (beam), about 2½ inches in diameter, keeps the ends of the wings apart, thus holding the net open. The brails are fastened to this beam by short bridle lines. The towing line is tied to the middle of another bridle line, each end of which is fastened to an end of the beam. When the net is pulled through the water, the cork and lead lines hang back of the beam in a U-shaped curve with the cork line slightly in advance. One 15-pound weight is attached to the lower end of each brail. The "lead" line itself is not weighted at all; it consists of old loosely twisted gill netting tied together to form a rope nearly 2 inches in diameter. The large diameter is to keep it from digging too deeply into the mud and the loose texture is so that it will become water-logged as soon as it is thrown overboard. The length of the lead line (and hence the slack with which it hangs)

*Contribution No. 135 from the California State Fisheries Laboratory, October, 1933.

is very important. A line, if too short, dips into the mud whereas a long one may pass over most of the shrimp. The bag is a 20-foot tube of webbing tied shut at the rear end. This length is so that a large catch can be divided, part shaken into each of the two halves, and hauled aboard in installments.

The net is carried with the beam laid lengthwise to the boat and the webbing is piled on top of it, all next to the rail. At the start of the haul, the boat is turned sharply toward the side on which the net is piled and the webbing is thrown overboard. After the webbing, the beam and brails go over and the center of the bridle line is quickly taken aft and hooked over a pin in the stern. The net is then towed on the surface until it has straightened itself out properly and the boat is headed in the right direction; then the bridle is slipped off the pin and the towing line is paid out.

The net is dragged with the tide for a short haul of half a mile or a mile. During the drag, the boat is steered with the net instead of with the rudder; a change of course is effected by moving the tow line to one side of the stern or to the other. When the drag is finished, the motor is reversed, the rudder turned so that the boat will pass just to one side of the net and the tiller is locked in position by placing a pin on each side of it. The tow line is hauled in by hand until the boat is along side of the net. The clutch is then thrown out and the forward

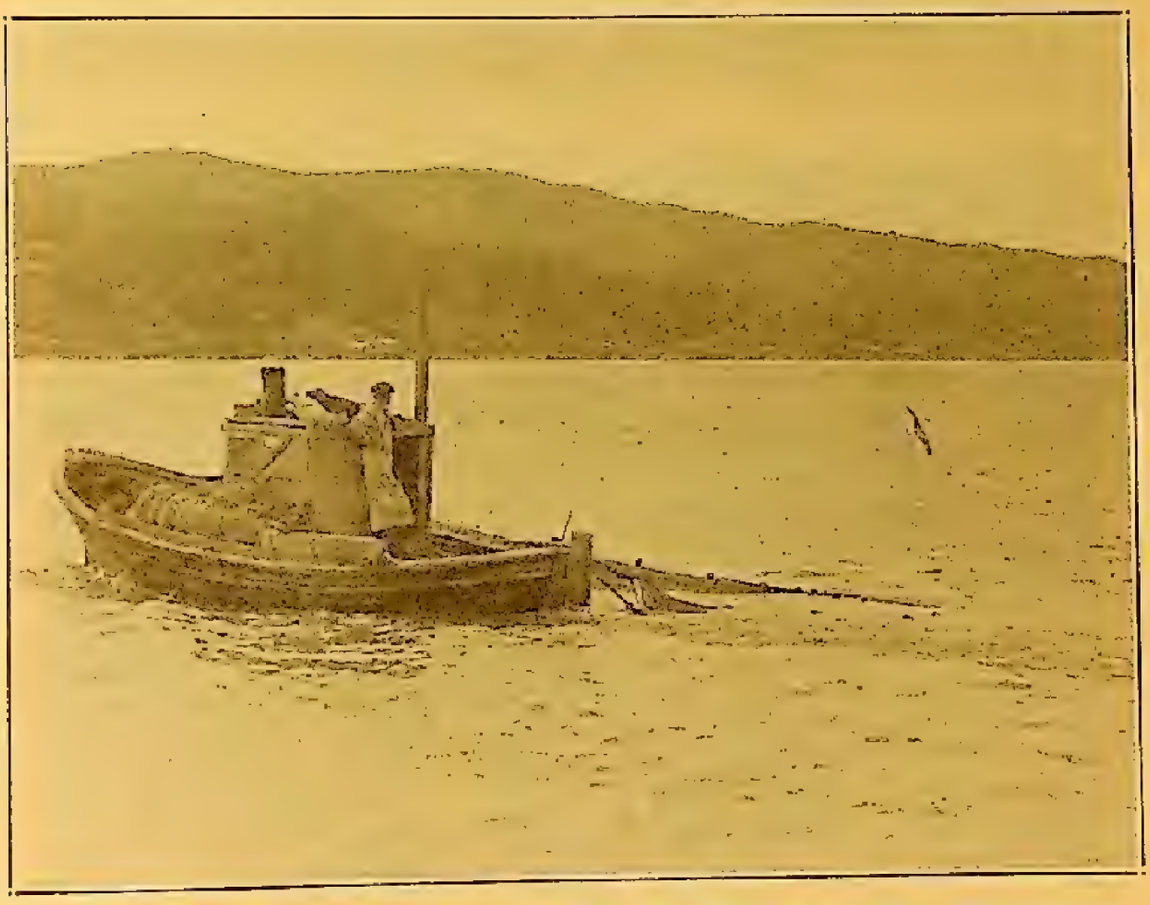

Fig. 85. Shrimp boat circling to lift net and catch to surface.

end of the net is lifted to the surface. The beam is laid on deck and held by two pins nearly 20 feet apart on the side of the boat, thus fastening the net to the side. The boat is then turned sharply toward that side and started forward. This maneuver is the same as the one

FIG. 86. Washing the catch by alternately hauling and releasing a rope attached to the end of the bag.

FIG. 87. Hauling the catch over the side.

used in getting the net out but serves in this case to lift the entire net and catch to the surface. When this is accomplished, the boat is stopped; the brails and forward part of the net are lifted on board and the forward part of the bag is made fast by wrapping it two or three times around a pin. Then the boat is started and the circling resumed. A rope, which leads from the forward part of the net to the tip of the bag, is then pulled in until the catch is washed from the rear of the bag into a part a few feet farther forward. The rope is then slackened and the shrimp are promptly washed back into the tip. This is repeated several times or until all the mud is washed out. The boat is then stopped and the bag is pulled in. If the catch is small, it is slid over the side; if large, it is lifted aboard with block and tackle. A lashing around the tip of the bag is removed and the catch is shaken onto the deck. The fisherman then goes back to his original starting point and begins a second haul. While the drag is being made, the catch is sorted, the shrimp are placed in baskets and the fish and waste are thrown overboard. It is illegal to keep fish taken in a shrimp trawl.

The best fishing appears to be at the last half of the incoming tide, the turn being the best of all. When I went out, all the boats were fishing near McNears Point on the Marin shore and in that area none of them bothered to fish the ebbing tide.

The reason for making several short hauls instead of one or two long ones is that the best fishing may be in a quite limited area. The system used is to drag several times over the area, going with the tide each time, and just at the turn of the tide, when fishing is best, to make a double length haul by turning about without lifting the net and dragging back over the course.

CALIFORNIA FISH AND GAME

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Vol. 19 OCTOBER, 1933 No. 4

FISH AND GAME LEGISLATION

With the close of the 1933 Legislature, the Division of Fish and Game has taken an inventory and found that the statutes passed have had a serious effect upon the activities of the organization.

Prior to the convening of the Legislature last January, Commissioners J. Dale Gentry, Earl B. Gilmore and I. Zellerbach, with Executive Officer John L. Farley, after conferring with sportsmen and fish and game organizations throughout the State, adopted a legislative program. This program contained less than 50 bills, most of them designed to clarify and strengthen existing laws, while the whole was formed to make better conditions for the angler and hunter.

When the introduction of bills had been completed, it was found that there were over 300 placed with the fish and game committees of the Senate and Assembly, dealing with our great natural resources—fish and game.

Many of these, thanks to the good judgment of the members of the legislative body, and to some hard work on the part of organized sportsmen, were killed in committee or were defeated on the floor of the two houses.

The outstanding bills passed and signed by the Governor were mostly concerned with angling. One that became a law will have a telling effect on the financial resources of the Commission in future years. It is the screen bill introduced by Assemblyman J. E. Frazier. By this measure, the Division of Fish and Game must stand half the expenses of the installation of fish screens at diversion points. Those familiar with the number of such screens that will have to be installed during coming years can secure a picture of what this will cost either in loss of fish or money.

Cutting down the striped bass season to three months commercial fishing was one victory the sportsmen won. Another was the closing of the Klamath River to commercial fishing. Both these measures have attracted much attention and called for bitter contests before the Legislature for years.

Catalina Island was closed almost entirely to commercial fishing, and swordfishing, a leading sport in southern California waters, was

given some protection through a bill which was passed prohibiting the shipping of swordfish commercially out of the State.

The Sacramento River above the M Street Bridge was thrown open to netting along many miles of the stream. However, this law will be effective only until the next session of the Legislature.

The deer season in California was changed so that from the southern Monterey County line south including San Bernardino, Los Angeles, Ventura, Santa Barbara, San Diego, San Luis Obispo, Riverside, Orange and Imperial counties are included in Districts 4 and 4¾, and will have a uniform season from August 16th to September 15th. A new district, 2¾, was formed of a portion of Mendocino and Lake counties, and Glenn County, opening and closing dates for deer hunting the same as in District 4.

The quail season was lengthened to six weeks, but the bag limit was cut to 10 birds per day or 20 per week, with a possession limit of 10 birds.

An open season of six days on pheasants was declared starting November 15th and closing on November 20th.

At the back of this issue of CALIFORNIA FISH AND GAME will be found an abstract of all fish and game laws enacted by the 1933 Legislature. A new fish and game code, provided by the Legislature, is in press and will be out in the next few weeks. In it will be found all the laws dealing with hunting and fishing in California.—*O. L. Warner, Division of Fish and Game, 450 McAllister Street, San Francisco, October 18, 1933.*

PERSONNEL OF THE DIVISION IS REDUCED

Faced with the necessity of making drastic retrenchments during the present biennium, owing to the impounding of $300,000 of fish and game funds by the Legislature and other expenses placed upon the Division of Fish and Game during the next two years, the Commission announced a heavy reduction in personnel beginning July 1, 1933. There were 33 employees dropped from the pay roll at that time, and more will probably be eliminated as time goes on.

Every bureau, with the exception of Fish Culture and Game Farms, was affected.

The Bureau of Patrol, the largest unit of the Division, laid off 15 game wardens. Two were captains, one being in charge of volunteer wardens, which work will henceforth be under the direction of the chief of patrol.

The office of assistant executive officer was abolished. The work of this official will be handled by a fish and game field superintendent.

Bureau of Hydraulics was abolished, the chief dropped, and an assistant transferred to the Bureau of Fish Culture, which will have supervision of such work as installing fish screens and clearing waters of pollution. An assistant in southern California was taken off the pay roll.

In the Bureau of Education and Research, a pathologist and lecturer were eliminated, and the librarian and director of publicity put on half time.

Seven members of the Bureau of Game Refuges, including three lion hunters, were let go, together with a bird and animal zoologist.

Two clerks and one junior accountant were likewise laid off. An accountant was transferred from the San Francisco office to the Sacramento office.

The position of director of the California State Fisheries Laboratory was abolished, and two researchers dismissed. The supervision of the work of the laboratory will be administered by the chief of the Bureau of Commercial Fisheries.

However, in announcing the curtailment in expenses, the Commissioners made it plain that no activities having to do with the production of fish and game will be disturbed. Plans for the present year provide for the raising and planting of more trout and other game fish, and more quail and pheasants than for many years past.—*O. L. Warner, Division of Fish and Game, 450 McAllister Street, San Francisco, October 20, 1933.*

STATE FISH EXCHANGE MERGES WITH DIVISION

During the recent session of the Legislature, the State Fish Exchange was abolished. This agency, conducted under the direction of the Department of Agriculture, has been operating for many years, but as a measure for economy, the legislators determined it was one of the units of the department that could be dispensed with. There was a surplus of money in the Fish Exchange fund, and it was determined at the Legislature that this money should be turned over to the Division of Fish and Game to be used for advertising, education and the promotion of the use of fresh fish.

Governor James Rolph, Jr., signed the bill providing this be done, and on August 21, 1933, the activities of the Fish Exchange became a part of the division. A. A. Alstrom, who has for some time had charge of the Fish Exchange, will continue with the marketing end of the department in its new association. He will work with Opie L. Warner in carrying out the provisions of the new set-up as designed by the Legislature. N. B. Scofield, head of the Bureau of Commercial Fisheries, will have chief direction of the work of the exchange.—*O. L. Warner, Division of Fish and Game, 450 McAllister Street, San Francisco, Calif. September 12, 1933.*

WATERFOWL REGULATIONS FOR 1933 SEASON

The Fish and Game Commission has decided to enforce federal waterfowl regulations during the 1933 season in California. The same practice is being followed by other western States.

For the convenience of hunters who are not familiar with the ducks which are fully protected at all times, the Division of Fish and Game is furnishing colored plates of the protected species.

The following are the Federal regulations:

Ducks, geese, mudhens and jacksnipe, the season opens at noon, November 1 and closes at sunset, December 31, with a bag limit of 25 mudhens, 25 in possession, 4 geese or brant, 8 in possession, and 20 jacksnipe, 20 in possession. There is no open season on Ross geese, wood ducks, ruddy ducks, and buffle-head ducks.

Ducks, 12 in the aggregate of all kinds but not more than 8 of any one or of the aggregate of the following species—canvasback, redhead, lesser scaup, greater scaup, ringneck, blue-winged teal, green-winged teal, cinnamon teal, shoveller or gadwall—shall be taken in any one day; and any person shall not possess more than 24 ducks in the aggregate of all kinds and not more than 16 in the aggregate of the following species—canvasback, redhead, greater scaup, lesser scaup, ringneck, blue-winged teal, green-winged teal, cinnamon teal, shoveller or gadwall—shall be possessed at any one time.

Not over 25 live duck decoys may be used. No live goose decoys may be used.

It is unlawful to shoot migratory game between sunset and one-half hour before sunrise.

Hunters may shoot on any day throughout the State except that shooting days on commercial gun clubs are restricted to Sundays, Wednesdays, Saturdays, opening day, closing day and all legal holidays.

Blinds on commercial clubs must be situated at reasonable distances from each other, but in no event are they to be less than 80 yards apart, and at no time shall more than two hunters occupy any one blind.

It is unlawful to shoot game from a power boat, sailboat, automobile, or airplane; or to hunt waterfowl from a scull boat in districts 8 and 9, except on Wednesdays and Sundays, or at any time in district 12, or in the Napa River south of Edgerly Island, or to use a shotgun larger than ten gauge, or to possess an extension automatic or a cane gun.—*E. L. Macaulay, Division of Fish and Game, 450 McAllister Street, San Francisco, Calif. October 18, 1933.*

FEDERAL DUCK FEEDING SURVEY

Word has just been received by the Division of Fish and Game that the Bureau of Biological Survey will gather detailed information concerning duck feeding by clubs in California during the coming hunting season. The bureau has detailed two of its men to secure the data in California. Mr. Johnson A. Neff will visit the duck clubs in northern California for this purpose, while Mr. Luther J. Goldman will handle the southern part of the State.

This announcement seems to lend strength to the prophecy that the Federal Government intends to do something about duck "baiting," or "feeding" as we prefer to call it, in California, before the 1934 season opens. We understand that Neff and Goldman are instructed to secure all information possible with reference to quantities of food exposed by the individual clubs and the manner in which it is placed out for the birds.

Most California sportsmen share the view of the Commission in regard to the effects of duck feeding in our State. They feel that a supplement to the available natural feed, now much reduced over former years due to reclamation, in the form of artificially placed duck food is absolutely necessary in order to provide ample sustenance for the ducks now wintering in California. It is believed that should the practice of supplying artificial food be stopped, many of the ducks now wintering with us would go elsewhere, notably continue on south into

Mexico, where they receive little or no protection from market hunting in its worst form.

We have not been advised whether or not similar Federal enquiries will be made into the duck feeding situation in other States; but we presume that they will be made. Harmful feeding, or baiting methods that were employed in parts of Illinois and Arkansas are really responsible for the sentiment that exists in some parts of the country against duck feeding. We hope that the Survey will secure information from these areas that will result in these practices being stopped if they still exist. However, the writer has always personally considered that the matter of feeding, or baiting, ducks is really a State problem that should properly be handled by the individual State organizations rather than through general country-wide regulations.—*James Moffitt, Division of Fish and Game, 450 McAllister Street, San Francisco, Calif., October 20, 1933.*

OPEN PHEASANT SEASON

This year for the first time there will be an open season on pheasants in practically all counties of California, which season will start November 15 and continue until and including November 20.

The counties closed to pheasant hunting during the 1933 season are Sonoma, Marin, Lassen, Ventura, Santa Barbara, San Luis Obispo and that portion of Modoc County south of the ninth parallel. The Legislature this year gave the commission the same power relative to upland birds it has with trout—that certain areas might be closed as a matter of conservation.

The raising and distribution of pheasants by the Division of Fish and Game was originally inaugurated in 1908. Since that time, thousands of these birds have been produced at the Yountville and Chino game farms. Care has been exercised in placing these desirable game birds in areas suited to them, and where under the protection of the Division they have steadily increased. It is estimated that there are hundreds of thousands of pheasants in California today.

Under the Hornblower bill, the Assembly fixed a six-day shooting period on pheasants, with a daily bag limit of two male birds and two in possession.

Pheasant hunting in Oregon and Washington has become a great attraction to the hunter, and it is hoped that California can match these two northern States in this regard. A careful check will be made during the season by deputies in the field on the number of hunters and their success in bagging these birds.

The first experiment on introducing into this State non-native game birds was in 1889 when the Legislature appropriated $2,000 for importing and liberating foreign game birds into California. W. H. Shebley purchased 140 ring-necked pheasants from Oregon, paying $10 a pair. These were set free in Monterey, Sacramento, Marin, and Nevada counties, and some in the San Joaquin Valley.

After watching the results of this first "planting," the then Fish Commission in 1894 purchased 67 more and turned them loose in localities where they believed the birds would thrive. In 1897, 323 ringnecks were brought into the State, and the year following, 143 addi-

tional. Many of these latter shipments were brought over from China, where the birds were purchased for 70 cents apiece.

With the establishment of a State game farm in 1908, arrangements were made for rearing pheasants. Special pens were constructed and a brood stock obtained, and the following years saw thousands of them hatched and raised. The first big plant was in 1912 when 1398 pheasants were released in 20 counties throughout the State.

FIG. 88. This novel sight to California sportsmen will be a common one during the open pheasant season, November 15th to 20th, inclusive. Photo by Tod Powell.

Pheasants have seemed to do better in the central and northern counties of the State, and in those areas where they are known to have established themselves and raised broods under natural conditions, especial attention will be given during the coming season.—*O. L. Warner, Division of Fish and Game, 450 McAllister Street, San Francisco, Calif., October 16, 1933.*

STUDY OF PACIFIC COAST DEER

Sportsmen and others interested in our deer population will be interested to learn that there is at present being undertaken an extensive and thorough study of the deer of the Pacific Coast.

Mr. Ian McTaggart Cowan, a resident of Vancouver, British Columbia, and a graduate of the University of that Province, is making this study under a teaching scholarship he won at the University of California, where Cowan is now working under Professor Joseph Grinnell, Director of the Museum of Vertebrate Zoology.

While Cowan's present work chiefly embraces the study of the systematic classification and distribution of the deer population from Alaska southward into Lower California, he will also devote a measure of consideration to the habits of the varius forms encountered in this area.

California is fortunate to have a man of Cowan's ability to make this much needed study, for our deer, the most abundant of our big game animals, have remained in a sore state of unsatisfactory classification for years. Cowan is particularly fitted to this job, for not only does he possess thorough scientific training and knowledge, but he is also an enthusiastic sportsman and hunter. This combination, unfortunately so rare in game research workers, should, and we are sure will, result in a fine piece of finished work that will be of great interest to our sportsmen.

Cowan's studies on California deer have been in progress for more than a year. To date he has described one new subspecies, a form of mule deer that inhabits the Mono and Inyo region of eastern California, to which he bestowed the name *Odocoileus hemionus inyoensis*. It may later be demonstrated that this is the form of deer occupying the entire southeastern border of the State, including the Colorado River region to which the burro deer *Odocoileus hemionus eremicus* has been ascribed in literature on geographic grounds, no specimen ever having been critically examined from that area.

Sportsmen who are interested in cooperating with Mr. Cowan in his study by providing him with reliable information on deer or specimens of examples he requires for his study (like a burro deer from eastern Riverside or Imperial counties for instance) should communicate with him at the Museum of Vertebrate Zoology, Berkeley. Any specimens so donated would become the property of the State University. In this regard, it may be of interest to note that advice concerning a herd of deer ranging along the Sacramento River west of Chico, provided the Director of the Museum of Vertebrate Zoology by J. S. Hunter, of this division, resulted in the museum recently sending a field party to this area where a number of specimens were collected for Cowan's study.—*James Moffitt, Division of Fish and Game, 450 McAllister Street, San Francisco, Calif., October 20, 1933.*

WILD ANIMAL IMPORTATION LAW

The 1933 Legislature enacted a law known as Chapter 76, Statutes of 1933, which provides State agencies with hitherto much needed control over the importation of certain noxious species of wild birds,

mammals and other animals. This measure, which was introduced by Senator Frank W. Mixter was backed by the State Department of Agriculture and the Division of Fish and Game.

Briefly, the bill excludes the following birds: Yellow hammer, hooded crow, carrion crow, rook, European starling, crested starling, common mynah, skylark, European blackbird, missel thrush, baya and Madagascar weaver; and a number of mammals including all wild rabbits, rats, mice, moles, gophers and allies, ground squirrels, prairie dogs, woodchucks, weasels, stoats, ferrets, fitches and mongoose; certain freshwater crayfishes and land slugs and snails. The last named are excluded because they harbor a liver fluke very detrimental to live stock.

Under the terms of this law, the Fish and Game Commission is required to formulate rules and regulations for its enforcement, and also to furnish descriptions and other explanatory and illustrated material concerning the wild birds and animals designated. The Division has in press at the moment the initial issue of these rules and regulations. The law requires the publication of an annual list of all the wild birds and animals that may not be imported into the State and this list will appear annually in the October number of this magazine.

The enforcing officers responsible for inspection of shipments of wild birds and animals are the fish and game deputies, the State plant quarantine officers and the county agricultural commissioners.

Certain of the species embraced by this law will be allowed entry into the State under permit. It is the Commission's duty to consider and issue these permits which, together with suitable application form for same, are fully described in the rules and regulations above referred to.

The proper procedure for a person desiring to import into California a species named in this act is first to make proper application for such importation to the Commission. If the permit is issued the original of same is sent to the importer, and a copy to the State Department of Agriculture to forward to the nearest State plant quarantine officer, or agricultural commissioner, to the point of entry. This agent will then inspect the shipment at the border and determine whether or not it is in accordance with the permit.—*James Moffitt, Division of Fish and Game, 450 McAllister Street, San Francisco, Calif. October 20, 1933.*

TRAPPERS PLACED IN MULE DEER AREA

Three expert trappers and field observers have been located in the mule deer country of the northeastern part of the State not only to trap coyotes and other predators, but to study in the field the habits of the Modoc mule deer and other species characteristic to that part of the State. These men have already shown their ability to make accurate field observations. The Division hopes to secure from these trappers, information which will enable it to make more effective conservation measures.

Laws that are based on facts that have been worked out in the field are the only kind that will endure the test of time. Information that will enable us to improve feed and water conditions will not only help

game interests, but will convince the live stock grower that we are interested in making the great outdoors a better place for him.

When it comes to checking up the information we have regarding the life history of almost every species of wild life, we find that there is a paucity of knowledge, many gaps to be filled before we can hope for ultimate success.—*J. S. Hunter, Division of Fish and Game, 450 McAllister Street, San Francisco, Calif. October 17, 1933.*

SECOND STATE FAIR DEER HEAD EXHIBIT

So successful was the first annual California deer head competition at the State Fair in 1932, that a similar competition was again held in connection with the Division's exhibit at the California State Fair, Sacramento, September 2 to 10, 1933.

In the first competition, 55 excellent deer heads were exhibited and this number indicated a wide interest in the competition on the part of sportsmen throughout the State, which interest was confirmed by favorable comment that the exhibit received by visitors at the fair. In spite of wide publicity given the second exhibit by the press throughout the State, and the fact that announcements for the 1933 competition advised that a larger number of prizes were to be offered this year, entries in 1933 were disappointingly few compared with the previous year, and but 20 entries were received for the competition.

Judging took place on Thursday, September 7. The committee was composed of the following: Gus Nordquist, Oakland; Charles G. Poole, Sacramento; W. B. Ryder, Sacramento; W. H. Shebley, Sacramento, and James Moffitt, San Francisco.

Prizes were awarded as follows:

First prize for Area 1, comprising Fish and Game Districts 1½, 2, 2½ was awarded to Leland Scott, Jr., Piedmont, who displayed an excellent pair of 4-point buck horns in the velvet. Since this was the only entry from this area, a second prize was not awarded.

First prize for Area 2, comprising District 1¾, or the mule deer area, was awarded to W. F. Gamma, Bieber, who entered a fine mule deer buck head with a 34½ inch spread.

Second prize for this area was won by Howard Wendt, Lookout, with a mule deer head with a spread of 32 inches.

First prize for Area 3, comprising Fish and Game District 1, or in general the Sierra-Nevada region, was awarded to F. R. Quigley, Sacramento, who entered a beautiful blacktail head taken at Chalk Bluff Mountain, Nevada County, which had a spread of 29¼ inches, and 7 points on each antler.

Second prize for this area was won by James Thomas, Floriston, with a mule deer head showing a fine spread of heavy horns 29 inches in breadth. It is interesting to note that this head was one of the typical Rocky Mountain mule deer that is the common species in Lassen and Modoc counties to the northward, but is replaced mainly by the blacktail deer in the Sierra Nevada region. However, some of the true mule tails occur in the eastern parts of Plumas, Sierra, Nevada and Placer counties. Competition for first place in this area between Mr. Quigley and Mr. Thomas' bucks was very close and it is interesting to note that it was won by a blacktail head by the slight margin of a quarter of an inch spread.

First prize for Area 4, comprising District 3, or the coastal area from San Francisco Bay to Ventura County, was won by a head exhibited by John A. Miller, Livermore. Singularly, this was the only deer head entered from this large area, and therefore no second prize was awarded.

First prize for Area 5, comprising Districts 4, 4½ and 4¾ was won by a mule deer head exhibited by Donald M. Falconer, Monrovia, which was taken at Dead Man's Pass, in Mono County. This head, a fine 4-pointer, had a 20½ inch spread. It is interesting to note that this head is one of the subspecies of deer so recently

described by I. McT. Cowan and mentioned elsewhere in this number of CALIFORNIA FISH AND GAME.

Second prize for Area 5 was won by William A. Magee, Jr., San Francisco, with a large forked horn spread measuring 20¼ inches which was secured last fall in San Diego County.

Awarding the prize for best conformity required considerable study and debating among the judges on account of the several beautifully conformed and matched heads that were entered. It was finally decided that first prize for best conformity be awarded to J. Rosslyn Thomas, of Sacramento, for a beautiful 4-point blacktail secured by him at Mud Flat, in El Dorado County, in 1931. So close was the competition between this head and a beautiful blacktail head entered by O. S. Johnson, Westwood, that it is only fair to mention this fact.

Prize for the largest deer killed by a sportswoman was awarded to Mrs. A. A. Rachford, Alturas, for a fine 3-point mule deer head that she secured at Lost Valley, in Modoc County, in 1931. The competition for the sportswoman's trophy was not as keen as it could have been with more entries, for the only other head was entered by Miss Milly D. Stoufer, Oakland.

Inasmuch as second prizes were not awarded for Areas 1 and 4 on account of single entries from these areas, the judging committee decided to use the two superfluous trophies by making the following awards:

Special prize for rugged mule deer head showing many points was awarded to Jack Forsythe, Williams, for an unique and beautiful head he secured at Dutch Flats, Modoc County, in the fall of 1932.

A special prize for an unusually fine blacktail head was awarded to Frank Girsch, Berkeley, for a head he secured at Stewart's Fork, north of Weaverville, in Trinity County.

It is not known at this time whether or not the Division will continue this competition as an annual event at the California State Fair next year because of the apparent lack of interest indicated by the few entries provided this year. However, if it is decided to hold a competition again in 1934, the fact will be announced in an early issue of this magazine.—*James Moffitt, Division of Fish and Game, 450 McAllister Street, San Francisco, October 18, 1933.*

REVIEWS

EDITOR'S NOTE.—This new department presents an innovation in CALIFORNIA FISH AND GAME that we hope will please its readers. The most outstanding books and papers appearing in scientific publications that relate particularly to conservation work in our State will be reviewed in these columns by members of the Division. In this way, we hope to keep our readers informed of pertinent current literature.

CALIFORNIA MACKEREL FISHERY

An interesting account of the California mackerel fishery has just been published by the California Division of Fish and Game as Fish Bulletin 40, being a contribution of the California State Fisheries Laboratory. This is the first concise publication on this fishery. Mackerel in the last few years has become of great importance in the fish canning industry of California. The author Richard S. Croker, gives the historical background of the fishery in this State from the days of the Gold Rush to 1933, showing its development and phenomenal rise during the last few years to the important position it now has in the fishing industry of California. The mackerel fisheries of central and southern California are discussed in detail, giving descriptions of fishing boats, methods and gear, fishing grounds, seasons, prices, etc. Under the section of "Handling, Packing and Marketing Mackerel," are described methods for the canning of this fish for human consumption and for animal food (the latter being a recent innovation), salting, kippering and smoking, and markets for the various products. A section is also devoted to the mackerel fisheries of the world—eastern coast of the United States, France, England, Japan and other countries, and a comparison of the total catches landed in these and other countries is given. According to available statistics, California ranked the highest in the world's mackerel fisheries during the years 1928 and 1929.

In addition to being of commercial value, mackerel plays an important part in sport fishing. The author describes angling for this species, which is carried on in four general ways—from piers from private or charter boats, from anchored barges, and from live bait "open" boats.

This bulletin is profusely illustrated with photographs, maps and graphs.

Copies may be purchased for 30 cents each, from the Division of Fish and Game, 450 McAllister Street, San Francisco.—*K. K., October 14, 1933.*

NEW YORK BIOLOGICAL SURVEY OF STREAMS

The Bureau of Fish Culture, of the California State Division of Fish and Game, has lately inaugurated a stream and lake survey of the State, and satisfactory progress is being made. The proposed work of the survey is directly related to the interests of angling—sport fishing—and its avowed purpose is to secure and record information of

basic conditions pertaining to a scientific policy of conservation and stream stocking.

In this connection, it is interesting to note the remarkable progress of similar work long ago undertaken by the State of New York, as set forth in a recent report of the Conservation Department and entitled "A Biological Survey of the Upper Hudson Watershed."*

The work was initiated in 1926 with a 12-year program intended to include the 19 watersheds of the State in a 12-unit project, one of which was to be completed each year. The present report includes the 7th. It is replete with information which is assembled and set forth in a useful and attractive way and copiously illustrated with many figures, photographs and maps. It ends with detailed stocking recommendations for every part of the included waters.

Some notion of the magnitude of the work may be gained from the statement that a staff of 36 scientists and fish experts recruited mainly from the educational institutions of the State was engaged and placed in the field. The intelligent direction of this staff was made possible partly through the experience of previous years. In addition to general discussions of considerable length, special topics such as the following are treated: A stocking policy for lakes and streams of the Upper Hudson Watershed; fishes of the region; lakes of the watershed; studies on fish food in selected areas; chemical investigations of the waters; pollution studies; aquatic vegetation; plankton studies in the lakes.

A few of the many remarks and suggestions relative to stocking streams are of particular interest:

"In order to formulate a stocking policy which is consistent with the observations made in the field, the history of conditions, the desires of fishermen and a sound conservation policy, many factors must be considered.

"* * * the situation of a stream particularly with regard to its accessibility and the character of the region through which it flows has a direct bearing upon the type of water to be found there and necessarily the type of fish to be stocked.

"Natural Food Available: The physical and chemical factors, together with the kinds of fish already present, determine the kinds of fishes to be stocked in a given situation, but the number of fishes to be stocked, to a large extent, is determined by the amount of natural food available."

"* * * Study of the fishes already present in a body of water often gives the most practical basis for judgment concerning a stocking policy. Each species of fish has its characteristic associates. Bass, perch, northern pike and other warm-water fishes in their native waters are found in association with a large variety of fishes. The trout is a natural aristocrat since it is found in company with only a few other species.

"As a usual thing the warm-water fishes after introduction into trout waters furnish fairly good fishing for a few years, meanwhile depleting the food supply; then, with the food supply reduced to a

* New York, State of. Conservation Department. A biological survey of the upper Hudson watershed. Supplemental to Twenty-second Annual Report, 1932. Biological Survey (1932) No. VII, 341 pp., 12 col. pls., many figs., and maps.

minimum they become stunted in growth and furnish very little fishing. In effect these waters have been polluted by the introduction of the wrong species of fishes since they will no longer produce good fishing of any kind.

"* * * A prime tenet of the good conservationist is that *exotic species should be introduced only when the native species, due to some permanent change in conditions, will no longer thrive in its original habitat, and not unless there is good foundation for the belief that the exotic species will fill its place efficiently.* The danger that such an introduced species will spread from waters where it would be suitable to waters in which it would be harmful is to be considered also.

"The warning voiced by Mather nearly fifty years ago that new species should be introduced into the Adirondack waters only after the most careful consideration is seen to have been fully justified. Had his warning been heeded when issued many of the waters now almost entirely unproductive would be yielding the yearly quota of trout.

"When the stream readings indicate a situation favorable for the introduction or continued planting of trout, the average width of the section in question, its average pool condition and the estimate of its food production are used to arrive at the number of fish to be planted.

"In isolated mountain streams where the drain by angling is low, and the conditions for natural spawning favorable, either light stocking or none at all has been recommended.

"The basic considerations for proper stocking are quite generally understood: that trout should be planted only in pure, cold water; that the temperature in the fish can should be slowly approximated to that of the water in the stream or pond before the trout are planted; that the trout should be scattered over a considerable area, approximating natural distribution rather than being dumped all in one locality. Often, however, these fundamental needs are disregarded due to the lack of time or lack of interest of the fish planters. Such neglect is inexcusable and every effort should be extended to make it impossible."

The above excerpts were quoted from section 1 of the Biological Survey on the "Stocking policy for Streams, Lakes and Ponds in the Upper Hudson Watershed" as drawn by C. Willard Greene, R. P. Hunter, and W. C. Senning, and quoted herein for their pertinent bearing on the work as it is being conducted in California.—*J. O. Snyder, Division of Fish and Game, 450 McAllister Street, San Francisco, Calif.*

LEOPOLD'S "GAME MANAGEMENT"

The book with the above title* that appeared in April, 1933, is easily the year's most important contribution to game conservation work. In fact, it may mark a new epoch in game conservation in America by introducing definite means of scientific procedure. So replete is this work with authoritative statements in regard to all the angles of the subject that an attempt to synopsize it here would be impossible. Everyone interested in game conservation should read this work and own a copy for study and reference.

The well known author, Aldo Leopold, consultant forester and game expert, requires no introduction to most American sportsmen.

* Leopold, Aldo. Game Management. (Scribner's, New York, 8vo., pp. xxii 481, 36 illustrations, price $5.) April, 1933.

His work under the United States Forest Service in New Mexico and later for the Arms and Ammunition Manufacturer's Institute on a "Game Survey of the North Central States" is familiar to all conservation workers and forms a background for the author that particularly fitted him to undertake the present work.

The first paragraph of the book defines game management as follows: it . . . "is the art of making land produce sustained annual crops of wild game for recreational use." Reading further we learn that: "Game management produces a crop by controlling the environmental factors which hold down the natural increase, or productivity of the seed stock." The first chapter also contains the embarrassing but true statement that "the conservation movement has sought to restore wild life by control of guns alone, with little visible success. Management seeks the same end, but by more versatile means. We seem to have two choices: try it, or hunt rabbits."

The volume is divided into three parts, the first of which deals with "Management Theory." This part commences with an interesting history of game management, both in this continent and abroad. Next the "Mechanism of Game Management" is explained and successive chapters deal with the properties of game populations. Under the latter heading, such complex and important problems as fluctuation and density of populations and movements, sex and flock habits are authoritatively, intimately and fully covered. Part I ends with a discussion of game range.

Part II discusses in detail the technique of game management and is of course the most important part of the book for the conservation worker. In fact, this part may well be termed a manual for game department officials and workers, and the reviewer has no doubt but that it will be used for this purpose for years to come. Some of the subjects treated in this subdivision are: game refuges; control of hunting; predators; food and water; cover and disease.

The third and final part contains remarks on game economics, covering some of the values to be derived from game, ways of marketing game crops and costs and revenues of game management. Game policy and administration is also outlined and the last chapter deals with game as a profession, pointing out among other things the qualifications necessary for game work and discussing the possibilities thereof.

A splendid bibliography, a glossary of terms used in game management and tables listing potential breeding possibilities of game, complete this attractively printed and illustrated book.

The reviewer would be guilty of heresy of the worst sort to attempt to criticize this phenomenal work. Nevertheless, he will voice his impression that the volume is too large, a bit too technical, and probably too much given to graphs and tables to be read from cover to cover as it should be by all conservation officials and workers in our United States. As it is, the work will certainly be studied and referred to by most serious workers, but the reviewer fears that many officials will not read it from cover to cover. If this is true, it is certainly regrettable, and could be overcome by the issuance of a shorter and more popular volume, designed for the layman, that we feel would fill a very definite nitch.—*James Moffitt, Division of Fish and Game, 450 McAllister Street, San Francisco, Calif., October 20, 1933.*

FOOD OF SEALS

The food of seals is an oft discussed and highly controversial question. Undoubtedly it varies from place to place and with the species involved. There have been few extensive and systematic investigations of this problem. One such, however, was completed recently in Holland, and the results appeared in a Dutch publication. Because of its general interest, the article has been translated. The following summary is not complete, but contains those topics of greatest interest to California readers. It must be emphasized that the conclusions of the author can not be applied to the California sea lion, as the feeding habits of this animal may differ radically from those of the European seal.

For those wishing to consult the original article, the reference is as follows: "Der Seehund (*Phoca vitulina* L.) in den Holländischen Gewässern," by B. Havinga; published in Tijdschrift der Ned. Dierkundige Vereeniging, ser. 3, deel 3, afl 2–3, pp. 79–111, 1933.

SUMMARY

After a pregnancy of about ten months, the females give birth to one young at the end of June or the beginning of July. At birth the young are 95 to 105 cm. in length and about 15 kg. in weight. They are suckled for about six weeks and increase rapidly in weight and length. The blubber fat of the young, thin at first, grows especially rapidly whereas that of the mother decreases in proportion.

Growth by actual measurement was followed for the first year. This is so rapid and the variation so great that length is no longer a good distinguishing character after the first year. The author discusses in some detail the size of different age groups and makes the statement that this seal probably has not attained its full size at the end of the third year. The longest individuals measured were 171 cm. (female), 174 cm. (male), and 175 cm. (female), of which the weights were 105, 100 and 76 kg., respectively. These seals probably attain a length of about 190 cm.

Sexual maturity is attained probably at the end of the third year, though not all individuals mature at this age. Breeding probably takes place in the water. The females give birth to the young in isolation away from the herd.

The longest section of this report deals with the food of this seal. The stomach contents of 238 seals from Dutch coastal waters were examined. Stomach and intestinal contents from 38 additional seals also were examined. A high percentage of the stomachs contained no food, whereas only in a few cases had digestion been sufficiently arrested to identify the organisms found therein. It was found that the skeletal elements of fishes, etc., were prevalent, and any specific determinations would have to be made from such. Of these the otoliths proved of the greatest value. Accordingly, a collection of otoliths was made from the common fishes of the Dutch coastal waters and used as a key to the identification of stomach contents. Moreover, the size of the otoliths was determined and the size and weight of the fish estimated. The author points out that it was impossible to determine whether the food had been taken directly by the seals or indirectly via the food of predatory fishes eaten by seals. In this way he explains the presence of great numbers of minute fish in the stomachs of seals.

In addition to bony fishes, there were found rays, lampreys, etc., in the stomachs. The author summarizes his results in a very extensive and complete table, a summary of which follows:

Species	*Total No.*	*Total weight in grams*	*Weight by Species in %*
Pleuronectes flessus	785	28,465	30
Pleuronectes platessa	360	3,490	3
Solea vulgaris	16	700	1
Pleuronectes limanda	36	1,500	2
Cottus scorpius	475	16,070	16
Zoarces viviparus	655	4,396	4
Clupea harengus	231	14,835	15
Gadus merlangus	246	15,990	17
Gadus morrhua	63	3,640	4
Osmerus eperlanus	72	1,800	2
Gobius minutus	2,164	2,303	2
Belone acus	6		
Engraulis encrasicli	2		
Ammodytes tobianus	91	1,000	1
Clupea finta	5		
Petromyzon fluviatilis	2		
Crangon (shrimp)	2,418	3,548	3

The shrimps which head the list, in numbers, are eaten only by the very young seals immediately after they are weaned. For a period of about six weeks the young are confined to this diet, after which they live almost entirely on fish. The few shrimp taken from the stomachs of adult seals are probably taken in the fish upon which the seals have fed.

The author notes that with the exception of herrings, all this food consists of bottom fish and suggests that the herrings may be taken by the seals from the nets.

The author then calls attention to two sources of error in his data: (1) There were too few large and fully adult seals included in this work. (2) Too little of the data was taken in the winter half of the year. Considering the first source of error, it appears from the available data that the diet of young seals differs appreciably from that of the adults. In the case of the adults, a much larger proportion of the food consists of larger flatfish. As far as the season is concerned, the evidence indicates that flatfish enter into the diet of seals more extensively in summer than in winter. In winter, species of cod (*Gadus*) play a more important part.

The author states that the diet of this seal (excluding the young ones) consists entirely of fish. In contradiction to recent and unpublished English work, the author says that he has seen no evidence to indicate that this seal feeds on mollusks, etc.

Havinga calls attention to the lack of sea-trout and salmon in the table. He states that this is not because the seals do not feed upon these fish but that it is due to the fact that salmon and trout are absent from the waters in which this work was mainly carried on. Salmon have been found in the stomachs of seals taken elsewhere. After some discussion the author concludes that this seal is a daylight feeder.

Discussing aquarium experiments, the author states that the seals usually bite off the head of a fish and do not eat it; but in nature there was no indication of this as all those seals which contained undigested fish in the stomach had apparently eaten the entire fish.

Two seals taken with full stomachs contained 7245 grams and 4500 grams of fish, respectively, in the stomachs and intestines. Since digestion takes place in about 18 hours, the author assumes that this is probably the average daily diet. (Seals appear to eat regularly every

day.) The author states that the average daily consumption is about 5 kg.

A short paragraph is devoted to the effects of the seals upon the fish populations. The author believes that they are an important element of destruction or depletion.

The last section, a short one, deals with the distribution of this seal. The author concludes that it is stationary rather than migratory, although he states that seals in winter are sometimes forced to the open sea because of lack of food or the occurrence of ice.

COMMENTS

A good paper and interesting reading. A thorough piece of work, though one wonders to what extent the author is prejudiced—*H. C. Godsil, California State Fisheries Laboratory, October 14, 1933.*

FOOD HABITS OF COYOTES

The August, 1933, number of the *Journal of Mammalogy* (quarterly publication of the American Society of Mammalogists) contains a report upon the food habits of coyotes by Charles C. Sperry, of the U. S. Bureau of Biological Survey (pp. 216–220). This paper is a progress report of anaylses of coyote stomachs collected in the twelve western States, mainly by Biological Survey trappers, during the months of September, October and November, 1931 and 1932. Analyses were made by the Denver Laboratory of the Division of Food Habits Research of the Bureau of Biological Survey.

We learn from this paper that the Biological Survey's Predatory Animal Control Force is sending to the Denver Laboratory regular shipments of coyote stomachs from the 12 western States and that the examination of their contents is progressing at the rate of 500 stomachs a month. Sperry writes that his next progress report will deal with the food habits of western coyotes during the winter and spring months.

In the report under review, we learn that 3042 coyotes stomachs were available for examination of which 1019 were empty, and 570 contained debris only leaving 1453 suitable for appraisal, and it is upon these that the report is based. Statistics are provided by two methods, first frequency of occurrence of a food in the total number of stomachs examined, and second the percentage of each food found in all the stomachs, measured by bulk. The first method shows how often coyotes feed upon a given food, while the second indicates the quantity of each food consumed. The results of this report may be illustrated as follows:

Results of an Analysis of 1453 Coyote Stomachs from 12 Western States Taken During Months of September, October, November, 1931 and 1932

	Frequency of occurrence	*Percentage by bulk*
Rabbits	39%—572 stomachs.	29%
Carrion	39%—568 stomachs.	29%
Domestic stock	22%—319 stomachs.	14%
Rodents	33%—479 stomachs.	17%
Miscellaneous animal food	2%—No data given.	2%
Lizards and snakes	3%— 44 stomachs.	Negligible
Insects	8%—116 stomachs.	1%
Deer	No data provided.	2%
Birds: Poultry	2%— 30 stomachs.	3%
Birds: Game birds	4%— 58 stomachs.	
Birds: Nongame birds	8%—121 stomachs.	
Vegetable Food	No data provided	3%

Analysis of the above table shows that coyotes prey most commonly upon rabbits. Food derived from this source, plus carrion consumed comprises 58 per cent of their diet by bulk. Sperry notes that the heading "carrion" includes horse, burro, cow and coyote remains and all so-called "station" material, such as bait or animal carcasses used to attract coyotes to traps or poison sets. It is notable that no sheep or goat remains are regarded as carrion. All remains of these animals are, the reviewer thinks most improperly, relegated to the heading "domestic stock" which Sperry explains as follows:

". . . the domestic stock item would be somewhat changed if some of it were allocated to the carrion column where it probably belongs. Present practice is to debit sheep or goat against the coyote whenever a trace of wool is found in a stomach, except in the few cases where the presence of wool coincides with the use of a sheep carcass at a trap or poison station." It need only be recalled that the sheepmen of western Nevada and northeastern California lost thousands of sheep this spring during the unusually severe weather that prevailed at lambing season. Undoubtedly coyotes "cleaned up" on most of these carcasses, yet were their stomachs secured for examination, they would be credited with having killed the sheep. The fact that the sheep died in spring would not prevent a hungry coyote from gnawing off a bit of dried skin and meat even during the following fall or winter. The reviewer saw carcasses of sheep in Lassen County, California, this September that had died the previous spring on which sufficient skin remained to provide a hungry coyote with a fair meal. Obviously, it is not quite fair to the coyote to consider all sheep and goat remains, "domestic stock killed," as Sperry's report would indicate is done.

Rodents, which comprise 17 per cent of the coyote's food by bulk and occur in 33 per cent of the stomachs examined, include squirrels, prairie dogs, rats and mice, etc.

The heading "miscellaneous animal food" includes badger and skunk, and we learn that moles, shrews, bats, weasels, bob-cats, mink and gray foxes are occasionally, but rarely eaten by coyotes.

Under "lizards and snakes" which formed too low a percentage of food by bulk to be recorded, Sperry advises swifts (*Sceloporus*) lead in frequency, while rattlesnake remains occurred in six coyote stomachs and bullsnakes in five.

Insects found in the stomachs were chiefly grasshoppers.

The percentages provided for birds are to the writer surprisingly low; however, this may be because of the season in which the stomachs were collected, and we will await with interest Sperry's reports upon the coyote's food for the spring and summer months, when birds should form a larger proportion of their diet. Sperry's findings in this report hardly justify the claims of so many western sportsmen that predatory animals, principally coyotes, are mainly responsible for our game bird depletion. We will form no opinion in this regard until analyses of the coyote's food for the entire year are available; but it scarcely appears from the present report that coyote depredations are as serious as some would indicate. Of the game bird remains that were found in 58 of the 1453 stomachs examined, 19 are of grouse, 7 quail and 9 ducks. The nongame bird remains identified originated chiefly from magpies

and jays, which are themselves regarded as harmful and predatory species to game birds. Other species of birds that appeared two or more times in the stomachs examined and relegated to the "Nongame" subheading, were: roadrunner, flicker, horned lark, raven, wren, robin, bluebird and junco.

Vegetable food consisted of fruit, berries and seed, of which cultivated fruit appeared in 18 stomachs, (grapes in 11 and figs in 7). Wild fruits, berries and seeds appeared in twice as many stomachs as cultivated varieties. Grass proved to be a rare item of food at this season.

The frequency in which deer remains appeared in the lot of coyote stomachs examined was not provided in the report, but it must have been low inasmuch as deer formed but 2 per cent of the volume of food by bulk. Unquestionably, more evidence from deer would be expected in coyote stomachs taken in winter and in the fawning period (early summer); nevertheless, the figures for the fall months here considered seem remarkably low. It should also be noted that the finding of deer remains in coyotes' stomachs does not necessarily imply that the deer were killed by these animals. For, just as in the case of sheep and goats, many deer unquestionably die each year from natural causes, are lost by hunters, or hides and remnants of hunters' kills are left in the hills and later afford carrion for coyotes.

The purpose of publishing this review is not an attempt to justify the coyote as a beneficial animal, although the present analyses indicate that at this season at least coyotes do as much good as harm by destroying rodents and rabbits, snakes, insects and by cleaning up carrion. All of us in game conservation work know very well that the coyote takes his toll of game species, birds and mammals. However, we believe that some individuals are prone to credit the coyote with more than his share of depredations. Such a course can only obscure the true causes for game depletion erroneously blamed on coyotes and further complicate matters. It is for the sole purpose of making the results of Mr. Sperry's study available to the readers of CALIFORNIA FISH AND GAME that this review is published. The writer hopes to review similarly in this publication Sperry's contemplated reports upon the coyote's food habits at other seasons, as same are issued.—*James Moffit, Division of Fish and Game, 450 McAllister Street, San Francisco. October 10, 1933.*

SHAW ON TOXICITY OF THALLIUM IN GAME BIRDS

An article by Paul A. Shaw, toxicologist for the Division of Fish and Game, entitled "Toxicity and Deposition of Thallium in Certain Game Birds," appeared in the August issue of *The Journal of Pharmacology and Experimental Therapeutics* (Vol. XLVIII, pp. 478–487).

Data on quail, geese and ducks indicated that these birds may be fatally poisoned with 12, 15 and 30 miligrams of thallium per kilogram of body weight, respectively. Muscular tissues such as the thigh, gizzard and breast acquired concentrations of thallium greater than the administered concentration; vital organs and bone absorbed a concentration approximately equal to that administered, while fat retained practically no thallium. Thirteen days following administration, the

tissues of a goose still retained 33 to 71 per cent of the administered concentration.

The probability that secondary poisoning in man might result from eating thallium poisoned birds was stated as slight, due to the quantity of such flesh that would be required to produce a toxic dose in man.

Studies on a dog indicated that four months or more would be required for complete elimination of a nearly fatal dose of thallium.—*P. A. S., October 10, 1933.*

COMMERCIAL FISHING NOTES

MACKEREL EGGS TAKEN OFF THE SOUTHERN CALIFORNIA COAST

Prior to 1933, practically nothing was known about the eggs and larvae of the Pacific mackerel (*Pneumatophorus japonicus diego*), though some searching had been done for them. During 1933, the State Division of Fish and Game patrol boat *Bluefin*, was used to cover the southern California waters from Santa Monica Bay to Point San Juan and off shore to San Clemente Island. Tow hauls were made throughout this area with six-foot nets at depths ranging from the surface down in some cases to about 200 meters. During June, July and August, eggs were discovered and were taken in quantities in Santa Monica Bay and in an area ranging from Seal Beach to Balboa Beach and from just outside the breakers to about four miles off shore. The water in both of these districts is shallow (under 30 fathoms) and the bottom is flat, comprised of sand or mud, and slopes gently away from sandy beaches. The greatest number of eggs were taken in surface hauls. The surface temperature ranged from 63 to 68 degrees F. at the time the eggs were taken.

After the *Bluefin* had located the grounds where eggs could be found, some were taken for hatching experiments with small boats, and using a two-foot net.

In order to make identification positive, the eggs were carefuly compared with drawings of Atlantic and Japanese mackerel eggs, then some of these eggs were hatched and the larvae compared with those of the other two species. Finally to remove all possible doubt and to learn something of the larval development, several attempts were made to raise the larvae to the point where they resembled the adult. After much experimenting with food and with methods for agitating, aerating, circulating, and controlling the temperature of the water, this was accomplished.

With the aid of this year's discoveries, we hope to be able to map out the spawning grounds of the Pacific mackerel.—*D. H. Fry, Jr., California State Fisheries Laboratory, October 14, 1933.*

CALIFORNIA FLYING FISH EGGS

While the State Division of Fish and Game patrol boat *Bluefin* was searching for eggs, larvae and young of the Pacific mackerel, it anchored in Catalina Harbor on the night of August 16, 1933. A light was hung over the side to attract whatever species might be around, while Deputy Tom Schilling and I went ashore with a beach seine. When we returned about midnight, there were two or three dozen California flying fish (*Cypselurus californicus*) under the light. Schilling watched them a few moments and suddenly realized that they were spawning. We managed to dip out about 10, all of which proved to be males. By picking out one which was being pursued by another we got a female. It was nearly spent but there were a few eggs left. These we fertilized and kept alive for several days. As I was not able

to take care of them at the time, I turned them over to Richard S. Croker, also of the California State Fisheries Laboratory. He hatched them and raised the larvae until they had been feeding three days. A detailed description of the eggs and larvae will be published later.—*D. H. Fry, Jr., California State Fisheries Laboratory, October 14, 1933.*

IMPROVED PROCESS FOR FISH MEAL

In the July, 1933, issue of the trade magazine, *Fishing Gazette,* appears an article under the title "New Type of Fish Meal Developed by Federal Government," by W. T. Conn, technologist, U. S. Bureau of Fisheries. The process developed by Conn is said to result in meal of greatly improved quality. The last paragraph will be of interest to producers in California: "The principles of the foregoing process are contained in U. S. patent No. 1903503, issued April 11, 1933, to W. T. Conn and assigned to the Government of the United States for use by anyone in this country without payment of royalty, and with existing extraction equipment."—*W. L. Scofield, California State Fisheries Laboratory, October 14, 1933.*

STATEMENT OF INCOME

For the Period July 1, 1932, to June 30, 1933, of the Eighty-fourth Fiscal Year

Departmental income	Detail	Total
License sales:		
Angling licenses, 1931	$927 00	
Angling licenses, 1932	323,030 00	
Angling licenses, 1933	58,398 00	
Commercial Hunting Club licenses, 1932-33	2,075 00	
Commercial Hunting Club Operators licenses, 1932-33	565 00	
Deer tags, 1932	95,557 75	
Fish Breeders licenses, 1932	40 00	
Fish Breeders licenses, 1933	370 00	
Fish Importers licenses, 1932	10 00	
Fish Importers licenses, 1933	70 00	
Game Breeders licenses, 1932	95 00	
Game Breeders licenses, 1933	957 50	
Hunting licenses, 1931	208 20	
Hunting licenses, 1932-33	439,691 47	
Hunting licenses, 1933-34	36 00	
Kelp licenses, 1932	30 00	
Kelp licenses, 1933	30 00	
Market Fishermen's licenses, 1932-33	23,600 00	
Market Fishermen's licenses, 1933-34	24,870 00	
Trapping licenses, 1932-33	1,660 00	
Wholesale Fish Packers and Shell Fish Dealers licenses, 1932-33	945 00	
Total license sales		$974,058 92
Other income:		
Contributions from importers	$190 00	
Court fines	30,784 13	
Fish Packers tax	120,156 07	
Fish tag sales	1,791 24	
Game tag sales	142 17	
Interest on bank balances	6,258 41	
Kelp tax	3 02	
License of kelp beds	1,300 20	
Miscellaneous sales	29 28	
Publication sales	622 50	
Total other income		161,286 02
Total departmental income—current year		$1,135,354 94

STATEMENT OF EXPENDITURES

For the Period July 1, 1932, to June 30, 1933, of the Eighty-fourth Fiscal Year

Function	Salaries and wages	Materials and supplies	Service and expense	Property and equipment	Total
Bureau administration:					
Executive	$9,500 01				$9,500 01
Clerical and office	21,682 41	$1,044 45	$402 46	$259 50	23,388 82
Printing		8,422 64			8,422 64
Automobiles		681 02	576 50	1,029 00	2,287 42
Traveling			4,272 34		4,272 34
Postage			5,593 34		5,593 34
Telephone and telegraph			3,824 29		3,824 29
Freight, cartage and express			2,431 37		2,431 37
Rent			13,354 72		13,354 72
Accident and death claims			4,719 74		4,719 74
Accounting pro rata	4,500 00				4,500 00
Legal	3,600 00		213 80	265 55	4,078 85
Premiums on bonds			1,351 32		1,351 32
Publicity			249 45		249 45
Total bureau administration	$39,282 42	$10,148 71	$36,989 13	$1,554 05	$87,974 31
Bureau education and research:					
Chief and assistant	$3,900 00				$3,900 00
Clerical and office	1,920 00	$55 50	$132 18		2,107 77
Automobiles		6 72		$591 28	598 00
Traveling			3,671 20		3,671 29
Telephone and telegraph			2 64		2 64
Photographer			159 33	382 03	541 96
Librarian	2,040 00	24 88	113 79	125 89	2,304 56
Research	6,600 00	35 83		11 80	6,647 63
Publicity	3,600 00		43 36		3,643 36
Lecturer	2,100 00				2,100 00
Total bureau education and research	$20,160 00	$123 02	$4,122 59	$1,111 00	$25,517 21
Bureau patrol and law enforcement:					
Chief and assistants	$11,100 00				$11,100 00
Clerical and office	3,180 00	$91 46	$2 78	$5 97	3,280 21
Automobiles		17,461 38	7,080 60	15,612 09	40,160 13
Traveling			88,081 87		88,081 87
Postage			623 59		623 59
Telephone and telegraph			1,674 12		1,674 12
Freight, cartage and express			23 98		23 98
Rent			472 52		472 52
Heat, light and power			10 00		10 00
Captains and deputies	100,555 22	841 43	609 95	92 01	201,098 61
Launches		1,836 60	1,702 56	809 50	4,348 66
Fish planting	4,620 00	349 62	1,108 31	917 50	6,995 43
Laboratory				10 00	10 00
Premiums on bonds			1,787 56		1,787 56
Temporary help	164 34				164 34
Cooks	1,500 00				1,500 00
Game refuge guard	90 00				90 00
Commercial fisheries patrol:					
Chief and assistants	2,760 00				2,760 00
Captains and wardens	16,560 00	5 13	72 50		16,637 63
Launches	12,002 24	3,590 32	1,734 56	141 57	17,468 69
Fish cannery inspectors—seasonal	14,950 02				14,950 02
Travel			7,865 74		7,865 74
Rent			788 96		788 96
Automobiles		189 13	90 15		279 28
Temporary help	253 34				253 34
Total bureau patrol and law enforcement	$266,735 16	$24,365 07	$113,735 81	$17,588 64	$422,424 68
Bureau commercial fisheries:					
Chief and assistants	$13,620 00				$13,620 00
Clerical and office	9,600 00	$129 82	$69 90	$74 49	9,874 21
Automobiles		398 75	201 88		600 63
Traveling			6,461 28		6,461 28
Telephone and telegraph			541 19		541 19
Freight, cartage and express			264 97		264 97
Rent			341 04		341 04
Heat, light and power			420 46		420 46
Research	3,185 95	128 99		18 51	3,333 45
Launches				1,386 00	1,386 00
Laboratory	25,499 74	636 42	1,119 60	256 78	27,512 54
Fish tags		237 00			237 00
Hydro-biological survey, Monterey Bay			1,500 00		1,500 00
Statistics		1,709 96	1,974 66	1,039 81	4,724 43
Fish cannery research			5,000 00		5,000 00
Total bureau commercial fisheries	$51,905 69	$3,240 94	$17,903 98	$2,775 59	$75,826 20

STATEMENT OF EXPENDITURES—Continued

For the Period July 1, 1932, to June 30, 1933, of the Eighty-fourth Fiscal Year

Function	Salaries and wages	Materials and supplies	Service and expense	Property and equipment	Total
Bureau fish culture:					
Chief and assistants	$10,810 00	$4 80			$10,814 80
Clerical and office	4,080 00	29 17	$42 83	$5 97	4,157 97
Automobiles		6,158 60	3,071 16	3,810 30	13,040 06
Traveling			11,227 40		11,227 40
Postage			174 36		174 36
Telephone and telegraph			1,310 99		1,310 99
Freight, cartage and express			1,048 59		1,048 59
Rent			2,176 85		2,176 85
Heat, light and power			1,566 55		1,566 55
Hatcheries	118,237 44	76,592 35	1,979 14	3,458 85	200,567 78
Special field investigations	7,270 00	62 45	10 25	132 70	7,475 40
Fish cars	3,540 00	373 55	725 80		4,639 35
Blue printing		2 50	19 89		22 48
Cooperative research	3,240 00	430 32	2,033 90	911 97	6,616 19
Temporary help	2,017 75				2,017 75
Fish hatchery assistant—seasonal	26,439 57				26,439 57
Total bureau fish culture	$175,634 76	$83,953 83	$25,387 71	$8,319 79	$293,296 09
Bureau hydraulics:					
Chief and assistants	$8,340 00				$8,340 00
Clerical and office		$29 38	$52 02	$46 07	127 47
Automobiles		548 64	230 81	563 88	1,343 33
Traveling			1,443 41		1,443 41
Postage			3 00		3 00
Telephone and telegraph			3 00		3 00
Total bureau hydraulics	$8,340 00	$578 02	$1,732 24	$609 95	$11,260 21
Bureau game propagation:					
Superintendents	$3,300 00				$3,300 00
Automobiles		$979 55	$230 39		1,209 94
Traveling			4,368 71		4,368 71
Postage			28 12		28 12
Telephone and telegraph			217 68		217 68
Freight, cartage and express			35 07		35 07
Heat, light and power			1,635 22		1,635 22
Maintenance	12,670 00	10,249 16	909 92	$53 00	23,888 08
Temporary help	3,351 60				3,351 60
Quail trapping and expansion of quail program	5,501 39	718 05	146 22	43 68	6,409 34
Total bureau game propagation	$24,823 99	$11,946 76	$7,571 33	$96 68	$44,443 76
Bureau fish rescue:					
Chief and assistants	$4,800 00	$38 84	$21 75		$4,860 59
Traveling			1,763 16		1,763 16
Rent			160 00		160 00
Temporary help	109 50				109 50
Total bureau fish rescue	$4,909 50	$38 84	$1,944 91		$6,893 25
Bureau game refuge:					
Chief and assistants	$8,500 00				$8,500 00
Clerical and office	2,119 74	$55 08	$61 33		2,236 14
Automobiles		654 30	301 23	$600 00	1,555 62
Traveling			4,217 51		4,217 51
Telephone and telegraph			3 62		3 62
Lion hunters and trappers	8,221 29				8,221 29
Refuge posting	720 00	7 84			727 84
Predatory animal control			7,450 00		7,450 00
Temporary help—seasonal	7,788 56				7,788 56
Refuge maintenance	6,197 50	1,964 52	2,084 90		10,246 92
Predatory animal hunters and trappers—seasonal	10,255 00				10,255 00
Fences				6,901 62	6,901 62
Total bureau game refuge	$43,802 09	$2,681 83	$14,118 58	$7,501 62	$68,104 12
Total eighty-fourth fiscal year expense	$635,508 61	$137,077 02	$223,506 28	$30,557 92	$1,035,739 83
Prior year expense—eighty-third fiscal year					9,562 63
Total paid from support—eighty-third and eighty-fourth fiscal years					$1,045,302 46

STATEMENT OF EXPENDITURES—Continued

For the Period July 1, 1932, to June 30, 1933, of the Eighty-fourth Fiscal Year

Special items	Property and equipment	Total
Construction, improvements and equipment:		
Bass ponds	$832 91	
General repairs, improvements and construction of cottage at the Brookdale Hatchery	1,814 12	
Construction on Cherry Creek dams	223 33	
Lake Elinor Egg Collecting Station	231 12	
Tank and Egg Collecting Station at Huntington Lake	77 74	
Kaweah Garage project	187 33	
Klamathon Station—Station House and Dry Room Project	310 64	
Klamathon Station—Warehouse Project	156 00	
Kosk Creek Egg Collecting Station Project	236 30	
Repairs and improvements at Mt. Shasta Hatchery	368 64	
Maintenance and improvements—Navarro River Jetty	33 70	
Opening Salinas River Channel	54 30	
Sebastopol Bass Rearing Ponds	351 68	
Construction of a Diversion Dam on Waddell Creek	322 50	
Construction of equipment for experimental trout investigation on Waddell Creek	67 87	
Construction of fish trap and tank on Waddell Creek	298 44	
Total construction, improvements and equipment		$5,566 97
Construction Russian River jetties—Chapter 60, 1931, or executive order 605, 84th fiscal year		2,671 15
Deer tight fences—Chapter 872, 31:		
From January 1, 1933, to June 30, 1933	$3,644 01	
From July 1, 1932, to December 31, 1932	2,422 80	
Total deer tight fences, Chapter 872-31		6,066 81
Electro Metals Company's claim—Chapter 599, 1931		18,760 00
License commissions		43,719 81
Purchase of game refuges		34,801 94
Expenditure for reimbursing bank account on account of failure of California National Bank—Department Finance, Chapter 141, 1933		37,090 10
State Fair and other exhibits		1,291 97
Total special items		$149,961 83
Prior year expense—82d fiscal year		6 60
Grand total, proprietary group		$1,185,270 90
In addition to the above expenditures the following amount was transferred from the Fish and Game Preservation Fund only to the State Employees' Retirement Fund		18,911 31

SEIZURES OF FISH AND GAME

April, May, June, 1933

Fish:	615
Abalones	3,217
Barracuda, pounds	
Bass—	28
Calico	91
Black	140
Striped	121
Striped, pounds	240
White Sea, pounds	822
Clams	426
Crabs	48
Catfish, pounds	165
Crappie, perch	6
Carp	258
Halibut	305
Mussels, pounds	195
Salt water perch, pounds	80
Scallops, pounds	739
Trout	10,619
Yellowfin, pounds	11,273
Skipjack, pounds	2
Seines, nets	14
Caviar, pint jars	
Game:	1
Bear	10
Deer	386
Deer meat, pounds	50
Ducks, geese	9
Doves	16
Non-game birds	5
Pheasants	2
Pigeons	421
Quail	2
Rabbits	3
Shorebirds	1
Tree squirrel	

FISH CASES

April, May, June, 1933

Offense	Number arrests	Fines imposed	Jail sentences (days)
Abalones; small; overlimit	50	$1,075 00	185
Angling; no license	135	1,709 50	210
Bass—			
White sea; closed season	3	50 00	
Striped; small; overlimit	21	345 00	10
Black; small	3	65 00	
Barracuda; small	7	25 00	17
Clams; small; overlimit	13	225 00	
Cockles; overlimit	1		
Crabs; small	6	100 00	
Commercial Fishing License Act; violations of	19	60 00	22
Halibut; small	3	125 00	
Mussels; overlimit	4	35 00	1
Operating set lines	5	250 00	
Seines, nets; illegal use of	14	100 00	120
Trout; closed season; overlimit	54	1,085 00	97½
Crappie, perch; overlimit	10	80 00	
Failure to keep record of fishing data	1		
Skipjack; small	1	25 00	
Angling in closed waters	10	195 00	
Salmon; small	1	10 00	
Fishing in game refuge (S. F. Refuge)	4		
Totals	365	$5,559 50	662½

GAME CASES

April, May, June, 1933

Offense	Number arrests	Fines imposed	Jail sentences (days)
Deer; closed season; killing of does, fawns, spike bucks	60	$1,300 00	683½
Bear; killing in closed season	1	10 00	
Ducks, geese; closed season	2	50 00	
Doves; closed season	1	10 00	
Hunting; no license	7	100 00	
Non-game birds; killing of	3	50 00	
Pheasants; closed season	11	125 00	213½
Quail; closed season	11	185 00	100
Rabbits; closed season	3	25 00	2
Tree squirrel; closed season	1	25 00	
Trespassing	5	42 50	50
Totals	105	$1,922 50	1,048

CALIFORNIA FRESH FISHERY PRODUCTS FOR THE MONTHS OF APRIL, MAY AND JUNE, 1933

Compiled by Division of Fish and Game, Bureau of Commercial Fisheries

Species of fish	Del Norte, Humboldt	Mendocino, Sonoma, Lake	Marin	Solano, Yolo	Sacramento, San Joaquin	Alameda, Contra Costa	San Francisco San Mateo	Santa Cruz	Monterey
Albacore									
Anchovy							86,865		43,998
Barracuda									
Bonito									
Cabrilla									
Carp		13,200		561	1,085	1,813			
Catfish				307	14,110	9,233			
Cultus	138,775	2,639					50,391	19,898	15,479
Flounder	81,488	3,420					6,817	5,187	52
Flying fish									
Hake	625						16,811	1,870	
Halfmoon									
Halibut—California							1,628	2,986	929
Halibut—Northern	176,516	721							
Hardhead		47,175			92				
Herring							775		100
Kelp Bass									
Kingfish							5,389	14,191	26,055
Mackerel—Horse									15,508
Mackerel—Pacific							215	222	238,711
Mullet									
Perch	2,398	1,224	11,123			168	3,675	3,950	14,071
Pike				30	6	92			
Pompano							59	15	13
Ray									
Rock Bass									
Rockfish	143,822	4,600					130,209	134,080	194,058
Sablefish	73,658						56,900	25,784	6,116
Salmon	1,052,363	173,423		5,784	98,580	59,457	12,301	152,723	409,706
Sand Dab	50,517	3,390					76,576	24,676	5,878
Sardine							235,080	341	436,337
Sculpin								45	

Sea Bass—Black									150
Sea Bass—White				49,317	29,857	777,997	132,788		
Shad	375						5,266	2,210	
Shark							24,732	6,170	3,446
Sheepshead	1,463	140							
Skate									
Skipjack						6,358	87,198	6,602	14,141
Smelt	6,858	1,125	6,527					110	
Smelt—Jack	80		5				550,719	337,690	11,247
Sole	1,052,344	74,150			74	05			
Splittail		3,375		7,096	50,897	178,738	7,145		
Striped Bass									
Sucker		750							
Swordfish—Broadbill							30		
Tom Cod									
Tuna—Bluefin									
Tuna—Yellowfin							21,839	503	
Turbot			110				20,317	32	809
Whitebait	17,447	6,297	1,027						
Whitefish									
Yellowtail							5,713	5,675	156
Miscellaneous	19,892								
Total fish	2,818,621	335,629	18,792	63,095	194,716	1,033,921	1,540,038	748,058	1,437,560
Crustaceans:									
Crab	45,870	1,576	31,499			1,248	837,070	29,052	33,812
Shrimp						23,300	308,498		
Spiny Lobster									
									690,700
Molluscs:									
Abalone	380	287	24,296						
Clam—Hardshell	2,311	568						230	1,786
Clam—Mixed									
Clam—Pismo		1,546	32,919			1,519			
Clam—Softshell							1,602	73	8,603
Mussel							34,672		3,902
Octopus			17,625				1,005		
Oyster—Eastern and Japanese			358					43	254,871
Oyster—Native									
Squid									
Miscellaneous:									
Turtle									
Totals	2,867,682	339,606	125,489	63,095	194,716	1,059,988	2,724,745	777,456	2,431,294

All amounts shown in pounds unless otherwise specified. Skipjack and Albacore cleaned.

CALIFORNIA FRESH FISHERY PRODUCTS FOR THE MONTHS OF APRIL, MAY AND JUNE, 1933

Compiled by Division of Fish and Game, Bureau of Commercial Fisheries

Species of fish	San Luis Obispo, Santa Barbara, Ventura	Los Angeles	Orange	San Diego, Imperial	Total	Fish from south of the International Boundary brought into California via San Pedro	Fish from south of the International Boundary brought into California via San Diego	Total fish from south of the International Boundary brought into California
Albacore		40			40			
Anchovy		13,200	280		141,343			
Barracuda	16,227	1,327,098	52,753	328,159	1,724,237	932	400	1,332
Bonito	280	31,772	3,123	434,643	469,818			
Cabrilla				42	42	7,432	10,355	17,787
Carp					16,659			
Catfish					23,659			
Cultus		60			227,240			
Flounder	10	103	162		97,329			
Flying fish		7,793			7,793			
Hake			3,587		22,893			
Halfmoon	250	255	210	274	989			
Halibut—California	77,260	157,432	25,953	14,387	280,575			
Halibut—Northern					177,237			
Hardhead					47,267			
Herring	28				903			
Kelp Bass		592			592			
Kingfish	503	33,737	526	391	131,392			
Mackerel—Horse		55,638	146		71,292			
Mackerel—Pacific	1,580	10,149,224	60,822	825,466	11,276,219		280	280
Mullet		462		9,628	10,090			
Perch	3,461	8,675			40,345			
Pike					98			
Pompano		2,388			2,475			
Ray		350			350			
Rock Bass	2,360	45,535	11,973	31,721	91,589	4,326		4,326
Rockfish	29,721	305,390	29,905	171,072	1,142,816	240	4,795	5,035
Sablefish	113	49,526	84,719		296,816			
Salmon	35				1,964,378			
Sand Dab		1,338	55		162,430			
Sardine	717	15,470		333,470	1,022,315			
Sculpin		20,328	387	1,394	22,154			

Sea Bass—Black	228	6,003	507	30,026	37,304	20,770	30,528	51,298
Sea Bass—White	3,549	48,550	397	11,499	64,145	1,095		1,095
Shad					989,059			
Shark	11,199	90,915	53,093	19,063	182,121	61		61
Sheepshead	567	10,015	44	2,372	12,998			
Skate	4	3,614	1,087		41,550			
Skipjack						3,105,615	2,162,950	5,328,565
Smelt	11,108	54,830		1,359	199,106			
Smelt—Jack	1,115	549		193	2,052			
Sole	207,525	19,709	209	630	2,254,223			
Splittail					3,544			
Striped Bass					243,876			
Sucker					750			
Swordfish—Broadbill		14,610	618	15,669	30,897			
Tom Cod					30			
Tuna—Bluefin						156,811		156,811
Tuna—Yellowfin				67	67	5,011,731	6,457,197	11,468,928
Turbot					22,542			
Whitebait					45,029			
Whitefish	60	5,717		18,947	24,724	1,402	846	2,248
Yellowtail		102,549	4,604	439,055	548,208	56,299	53,580	109,879
Miscellaneous	205	4,580	953	300	37,504			
Total fish	308,114	12,038,086	337,043	2,690,427	24,225,000	8,456,714	8,720,031	17,177,645
Crustaceans:								
Crab		5,870			986,897			
Shrimp					331,798			
Spiny Lobster						1,570	26,808	28,378
Mollusks:								
Abalone	111,584				802,284			
Clam—Hardshell		2,176			27,139			
Clam—Mixed					3,370			
Clam—Pismo	21,337				23,403			
Clam—Softshell					35,084			
Mussel			60		60			
Octopus		2	22		10,302			
Oyster—Eastern and Japanese					56,259			
Oyster—Native					1,423			
Squid					254,914			
Miscellaneous:								
Turtle							2,001	2,001
Totals	501,035	12,046,134	337,125	2,690,427	26,758,842	8,458,284	8,750,040	17,208,024

All amounts shown in pounds unless otherwise specified. Skipjack and Albacore cleaned.

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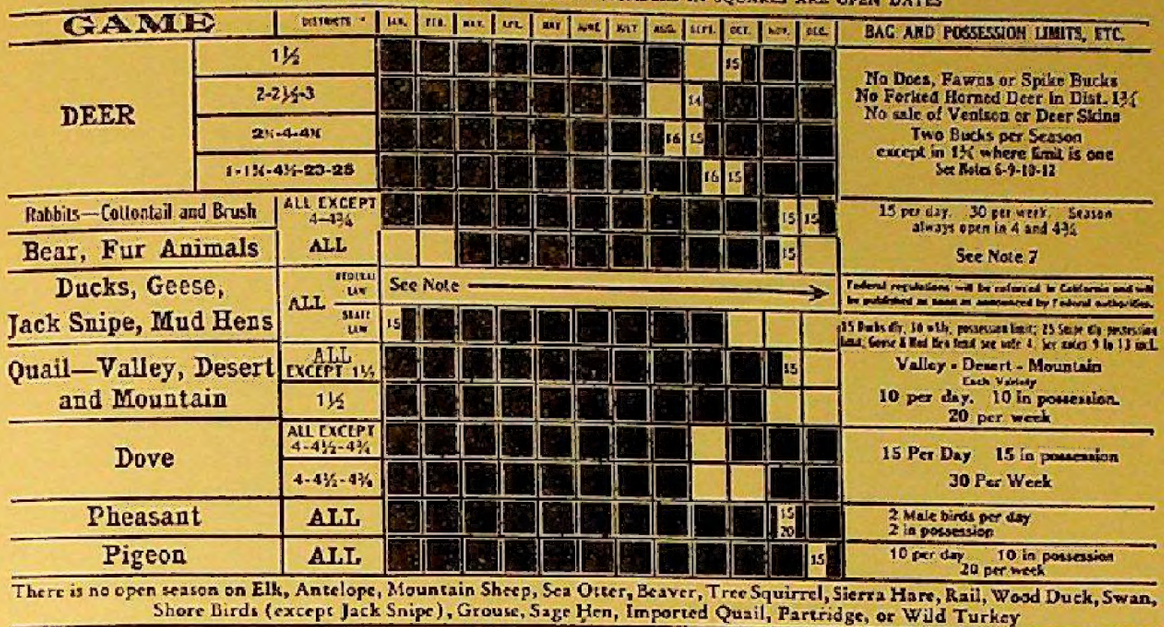
1933—ABSTRACT CALIFORNIA SPORTING FISH & GAME LAWS—1935

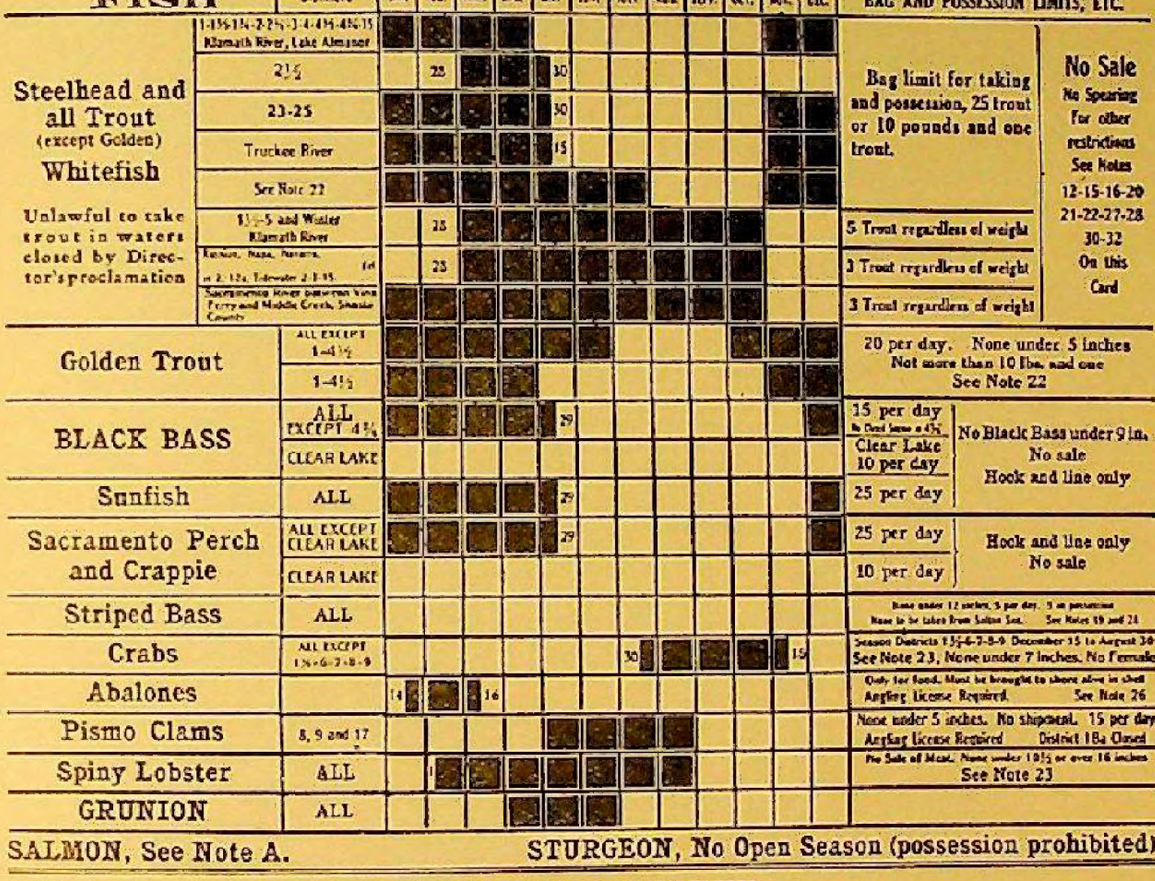
THIS ABSTRACT WILL BE VALID UNTIL 90 DAYS AFTER ADJOURNMENT OF THE 1933 LEGISLATIVE SESSION

OPEN AND CLOSED SEASONS

WHITE SQUARES INDICATE OPEN SEASON. NUMBERS IN SQUARES ARE OPEN DATES



There is no open season on Elk, Antelope, Mountain Sheep, Sea Otter, Beaver, Tree Squirrel, Sierra Hare, Rail, Wood Duck, Swan, Shore Birds (except Jack Snipe), Grouse, Sage Hen, Imported Quail, Partridge, or Wild Turkey



SALMON, See Note A. **STURGEON, No Open Season (possession prohibited).**

NOTES

IT IS ALWAYS UNLAWFUL

1. To hunt, kill, possess wild birds or mammals, to possess firearms, except under written permit from the Commission, in Dists. 1a, 1b, 1c, 1d, 1e, 1f, 1g, 1h, 1i, 1j, 1k, 1m, 1n, 1o, 1p, 1q, 1r, 1s, 1t, 2a, 2b, 3a, 3b, 3c, 3d, 3e, 3f, 3g, 3h, 4a, 4b, 4c, 4d, 4e, 4f, 4g, or General Grant Refuge, or Mt. Tamalpais Game Refuge, including Richardson Bay, or San Francisco Refuge, or Silver Lake Refuge (water fowl may be killed in 4a and 4c), or to hunt quail in Bolinas Quail Refuge, or to hunt or discharge firearms in Huntington Lake Refuge, San Leandro Bay Refuge, or Monterey Peninsula Refuge.

2. To hunt birds or mammals excepting predators without a hunting license. To hunt in areas closed by proclamation.

3. To possess any bird net or to net, trap or to hold protected game or birds of any kind, their nests or eggs except under written permit from the Commission.

4. To take more than 4 geese per day, 8 per week of all varieties, and 12 Canada geese and black sea brant. To take more than 25 mud hens per day, 50 per week. To have more than 1 daily bag limit of geese and mud hens in possession by 1 person in 1 day.

5. To take or kill nongame birds, except blue jay, butcher bird, English sparrow, sharp-shinned, Cooper or duck hawk, great horned owl, linnet, crow, black-billed magpie, white pelican, shag, and in Dists. 1, 2, 3, 4 and 12, blackbirds.

6. To hunt deer without deer tag license. To fail to attach to horns of deer immediately on killing, properly filled out deer tag or at same time to send duplicate tag to Division. To carry deer into closed district without having deer tag countersigned, or to have untagged deer in possession. To fail to retain in possession during open season and for 10 days after, skin and portion of head bearing horns of deer killed and to produce upon demand. To use more than 1 dog to hunter in hunting deer or to allow dogs to run deer in closed season, or to possess doe or fawn skins, or deer skins not bearing evidence of sex.

7. To trap for profit bear, ring-tailed cat, coon, pine marten, skunk, fisher, wolverine, mink, river otter, fox or muskrat, or to kill same during closed season, except when destroying property. To interfere with traps of licensed trappers. To use saw tooth or spike-jawed traps for taking fur bearers.

8. To use any animal other than dog to stalk wild birds.

9. To shoot game from power boat, sailboat, auto, airplane; or to hunt waterfowl from scull boat in Dists. 8, 9, except on Wed. and Sun., or at any time in Dist. 12 or Napa River south of Edgerly Island, and in Mare Island Straits from the Napa River to Carquinez Strait, or to use shotgun larger than 10 gauge, or to possess an extension automatic or cane gun. To have in possession any device capable of or to be used in silencing the report of any firearm.

10. To shoot resident game between ½ hour after sunset and ½ hour before sunrise, or migratory game between sunset and ½ hour before sunrise. To use a spotlight in hunting game.

11. To drive game birds by means of auto, airplane, or power boat over shooters.

12. To hold game or fish longer than 5 days after close of season; venison 15 days.

13. To sell wild game, except cottontail and brush rabbits.

14. To make a false statement in applying for license. To fail to show license upon demand to any officer.

15. To take game or fish from one district to another when season is not open in both. (Special law for deer, trout and black bass.) Trout legally taken may be transported from open district into closed district by the consignor making an affidavit in duplicate setting forth his name, address, number of angling license and name and address of consignee. Original must be attached to shipment; copy left on file with officer before whom sworn. Trout may be shipped into closed district when accompanied by written statement to effect that trout were legal, signed by shipper, countersigned by agent to whom offered for shipment. Black bass legally taken may be transported from open district into closed district.

16. To ship wild birds, mammals, or fish except smoked or dried fish other than trout by parcels post, or in concealed packages or without a tag bearing name and address of consignee and consignor and contents, or to ship game out of State.

17. To operate a commercial hunting club without license.

18. To place obstructions in streams in Dists. 1, 1½, 2, 2½, 2¾, 3, 4, 4½, 23 and 25 that will stop or impede fish.

19. To sell striped bass taken with hook and line; to transport or carry striped bass out of State. To ship striped bass less than 20 in. in length or more than 10 lbs. in weight. To possess more than 5 shad per day between June 1 and Feb. 14.

20. To take trout other than with rod and line held in hand or with lure with more than 2 attractor blades or more than 3 hooks. To take trout except by angling in such manner as to cause trout to voluntarily take hook in its mouth.

21. To have in possession any fish spear or gaff (except landing gaff) within 300 feet of any lake or stream when unlawful to spear salmon.

22. To take trout in any lake within 300 feet of mouth of any stream from Oct. 31 to Aug. 1, or in that portion of any stream flowing into any lake in Dist. 23 within 2 miles from its mouth, upstream, from Oct. 31 to Aug. 1. To take golden trout in Cottonwood Lakes group, including South Fork Cottonwood Lakes group and ½ mile of stream below the lower lake in each of said groups, except from July 1 to Oct. 31.

23. To bring to shore crabs or lobsters in such condition that size can not be taken; or to ship or carry crabs out of Dists. 14, 24, 5, 6, 7, 8 or 9. To sell any crabs taken in Eel River or tributaries or to possess more than 10 crabs taken there or to take any between ½ hour after sunset and ½ hour before sunrise.

24. To take or possess in Dist. 3 salt water eels of less than 12 in. or more than 15 per day.

25. To take or possess cockles less than 1½ in. in diameter, or to take or possess more than 15 (Dists. 2 and 10) Washington clams or more than 10 horse clams or more than 30 razor or jackknife clams per day, or in Dists. 18, 19, 21 more than 15 lbs. of mussels per day. To take or possess any Pismo clams in Dist. 18 between ½ hour after sunset and ½ hour before sunrise, or to possess any clam digging implement in that district. To possess any clam digging implement in any clam preserve.

26. To take red abalones less than 7 in. in greatest diameter; green, 6½; pink, 6; black, 5; to dry abalones; to dive for abalones in Dists. 7, 15, 16, 17, 19, 20 and 20a; to take more than 10 per day or 20 per week in Dists. 7, 15, 16, 17, 19, 20 and 20a. To take more than 10 per day from shore in Dists. 7, 10 and 18; to take more than 10 black abalones per day in Dists. 15, 16, 17, 18, 19, 20, 20a, 21. To possess more than 10 per day in Dist. 2.

27. To fish for game fish without having an angling license.

28. To take game fish between 1 hour after sunset and 1 hour before sunrise in Dists. 1, 1½, 1⅔, 2, 2½, 2¾, 3, 4, 4½, 4⅔, 23, 25. To take striped bass by hook and line between sunset and sunrise.

29. To fish with nets except in commercial districts or to injure any legal net.

30. To fish through ice for any fish or to take fish in Dist. 14.

31. To place, cause to be placed, or discharge into any waters substances deleterious to fish or plant life.

32. To fish within 250 ft. of fishway or 150 ft. of upper side of fish screen, or lower side of dam, or to take fish except salmon within ½ mile of either side of spawning station, or any lake within ½ mile of spawning station when station is in operation.

33. To kill, injure or capture Cal. sea lions in Dists. 19, 20, 20a.

34. To take invertebrates or marine plants in Hopkins Marine Refuge (Monterey Co.) or in that area between the west line of the property of the Scripps Institute and a line 1,000 feet west of low tide line (San Diego Co.).

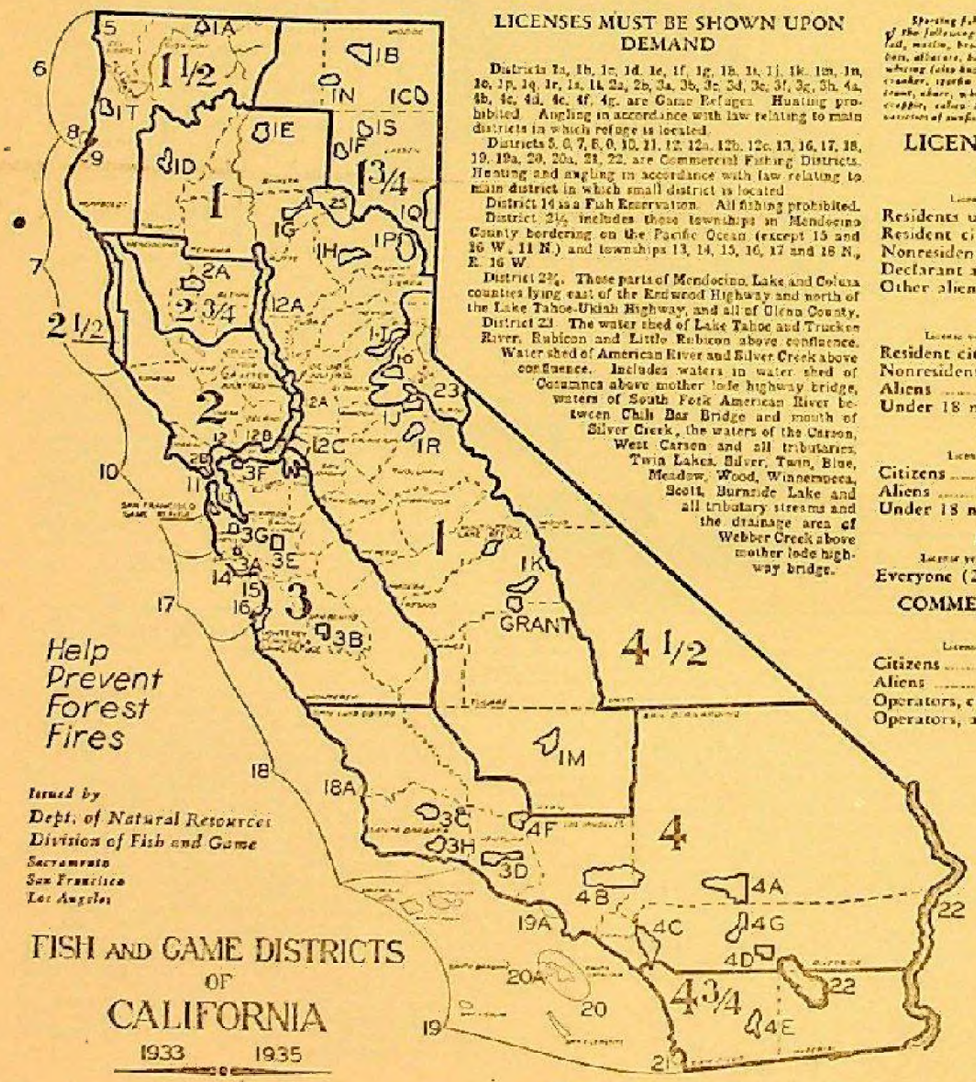
35. To take more than 5 white sea bass from May 1 to June 30, or to take at any one time more than 5 under 28 in.

36. To take more than 30 lbs. of halibut under 4 lbs. each, or to take more than 5 barracuda less than 3 lbs. each.

37. To take frogs less than 4 in. in length measured from tip of nose to posterior end of body between hind legs, or to take or possess more than 24 frogs per day or 48 frogs per week.

NOTE A.—SALMON. Salmon can not be taken on spawning beds, or within 10 miles of spawn-taking station, or 3 miles north and south of mouth of Klamath River. All salmon boats must have landing net; and no Chinook less than 27 or silver less than 24 in. can be taken in ocean and Humboldt Bay Dists. Undersized salmon can not be gaffed or clubbed, or brought ashore in such condition that size can not be determined. Salmon may be taken with hook and line in any district when trout season for said district is open.

In Dist. 1, salmon may be taken with hook and line or spear between May 29 and Oct. 31, except (a) in Feather River from its mouth to mouth of the Yuba; (b) in American River from its mouth to Fair Oaks bridge. In Dist. 2, (c) in Russian, Napa and Navarro rivers; (d) in Eel River and (e) in tidewater in Dists. 2, 2 and 15, with hook and line from May 1 to last day of Feb., bag limit 2 per day. In Feather River between mouth of Yuba and Thermalito bridge, with hook and line between May 1 and Dec. 31, bag limit 2 per day. In San Joaquin River, from mouth to Mendota weir, with hook and line from April 1 to Dec. 31. In Dist. 1½, with hook and line from May 29 to Dec. 31; with spear from Aug. 1 to Oct. 31, bag limit 2 per day. In Dists. 2, 2½, with hook and line from May 1 to Feb. last; with spear from Nov. 1 to Feb. last, bag limit 2 per day. In Dist. 3, with hook and line from May 1 to Oct. 31, bag limit 2 per day. In Klamath River Dist. above tidewater, with hook and line from May 29 to Dec. 31; with spear, from Aug. 1 to Oct. 31, bag limit 2 per day. In Klamath River Dist. in tidewater, with hook and line from May 29 to Dec. 31. Bag limit is 5 per day from May 29 to Sept. 5, and 2 per day from Sept. 6 to Dec. 31, not more than 1 daily bag limit in possession. In Dists. 6, 7, 8, 9 with hook and line from April 1 to Sept. 15, no bag limit. In Dists. 10, 11, with hook and line from May 1 to Aug. 31, no bag limit. In Dists. 12, 12B, 12C, 13, with hook and line at any time, no bag limit. In Dist. 12A, with hook and line from May 1 to Feb. last, bag limit 2 per day. In Dists. 15, 16, 17, 18, with hook and line from Mar. 1 to July 15.



LICENSES MUST BE SHOWN UPON DEMAND

Districts 1a, 1b, 1c, 1d, 1e, 1f, 1g, 1h, 1i, 1j, 1k, 1m, 1n, 1o, 1p, 1q, 1r, 1s, 1t, 2a, 2b, 3a, 3b, 3c, 3d, 3e, 3f, 3g, 3h, 4a, 4b, 4c, 4d, 4e, 4f, 4g, are Game Refuges. Hunting prohibited. Angling in accordance with law relating to main districts in which refuge is located.

Districts 5, 6, 7, 8, 9, 10, 11, 12, 12a, 12b, 12c, 13, 16, 17, 18, 19, 19a, 20, 20a, 21, 22, are Commercial Fishing Districts. Hunting and angling in accordance with law relating to main district in which small district is located.

District 14 is a Fish Reservation. All fishing prohibited.

District 2½ includes those townships in Mendocino County bordering on the Pacific Ocean (except 15 and 16 W., 11 N.) and townships 13, 14, 15, 16, 17 and 18 N., R. 16 W.

District 2¾. Those parts of Mendocino, Lake and Colusa counties lying east of the Redwood Highway and north of the Lake Tahoe-Ukiah Highway, and all of Glenn County.

District 23. The water shed of Lake Tahoe and Truckee River, Rubicon and Little Rubicon above confluence. Water shed of American River and Silver Creek above confluence. Includes waters in water shed of Consumnes above mother lode highway bridge, waters of South Fork American River between Chili Bar Bridge and mouth of Silver Creek, the waters of the Carson, West Carson and all tributaries, Twin Lakes, Silver, Twin, Blue, Meadow, Wood, Winnemucca, Scott, Burnside Lake and all tributary streams and the drainage area of Webber Creek above mother lode highway bridge.

Sporting fishing licenses are required for the taking of the following fish and mollusks only: trout, yellow tail, marlin, broad bill swordfish, grunion or black sea bass, albacore, barracuda, bonita, rock bass, Californian whiting (also known as croakers and surf fish), yellowfin, crawfish, spotted crawfish, salmon, steelhead and other trout, abalone, whitefish, striped bass, black bass, perch, crappies, catfish bass, Pismo clams, abalones, and all varieties of mollusks.

LICENSE PROVISIONS

HUNTING

License year July 1 to June 30

Residents under 18	$1.00
Resident citizens	2.00
Nonresident citizens	10.00
Declarant aliens	10.00
Other aliens	25.00

ANGLING

License year January 1 to December 31

Resident citizens	$2.00
Nonresident citizens	3.00
Aliens	5.00
Under 18 no license required	

TRAPPING

License year July 1 to June 30

Citizens	$1.00
Aliens	2.00
Under 18 no license required	

DEER TAG

License year January 1 to December 31

Everyone (2 tags)	$1.00

COMMERCIAL HUNTING CLUBS

License year July 1 to June 30

Citizens	$25.00
Aliens	100.00
Operators, citizens	5.00
Operators, aliens	25.00

For Laws in Full See Fish and Game Code

For Commercial Fish Laws See Commercial Abstract

For Information Regarding Fish or Game Write to the Division of Fish and Game

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Captains indicated in capitals.

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